

BP 130 - D.H.F. Reading

2016 06 10

# TO-DO — FUTURE UPDATES

## CORRECT STC TXT:

STCs: Remove the revisions in the P/N.

- BP44 → Done in 2013
- BP350 → Cannot be done as "E" part of docs submitted by Aizat.
- BP130 → 314-0031-00-A

↑  
remove at next update  
STC.

314-0020-00-E  
↑  
this is no more the Rev. it is part of the No.

## NEW FORM

PRO-XX

Agouta nov. formatae officia

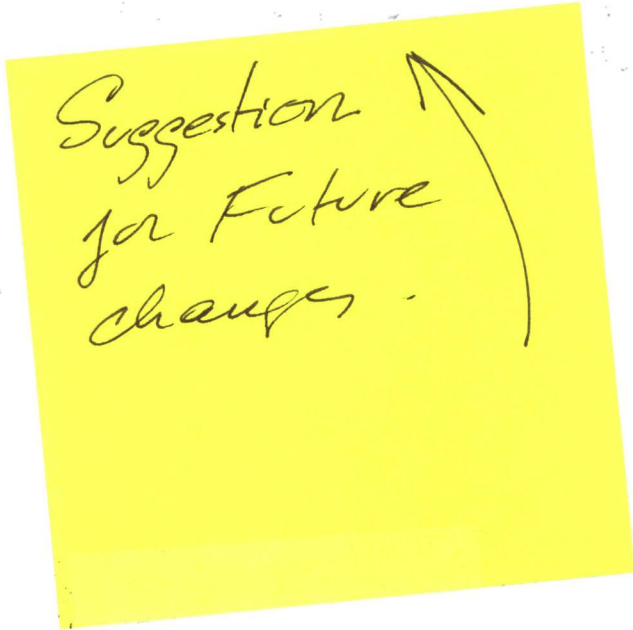
Exhiber Excel		
Contenue de cas	Bater	

## ISSUE RNC

BP350 PADS: Wrong P/N grave ser kad.  
Dait Eke 112-0002-00-S rev. E



Suggestion  
for Future  
changes.

A yellow rectangular sticky note is placed on a white background. It contains the handwritten text "Suggestion for Future changes." in black ink. A curved arrow is drawn on the right side of the note, starting from the middle and pointing upwards and to the right.

NOTE: ICEBLADE & 1/4" FICKER  
BLOCK

WHEN THE DWGS FOR THESE PARTS  
WERE UPDATED TO REV. B IN 2013  
FOR THE BP44, THEY WERE NOT  
DISTRIBUTED TO THE DMR &  
MDL OF THE BP350 WHICH  
+BP130  
USES THE SAME PART.

THESE ARE THE OUTDATED  
COPIES REMOVED FROM THE  
DMR OF BP350 & BP130

NOTE: (II) MDL REV. H SHALL BE  
CORRECTED TO SHOW REV "B"  
IN SECT. 90 MASTER DWGS, P. 2/3.  
AT NEXT UPDATE.



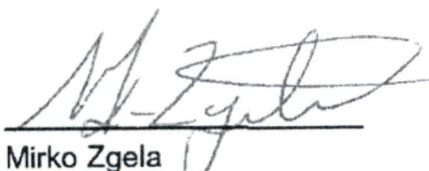
## Master Document List

Helitowcart

### Eurocopter Model EC 130 B4 Helicopters Installation of BearPaw Model BP130

Report: HTC-MDL-BP-EC130-1000 (Rev A)

APPROVED BY:



DATE: MAI 13, 2011

Mirko Zgela  
Design Approval Representative DAR #310





## 1.0 MASTER DOCUMENTS

Document #	Title	Revision Status	Approval by	Date
AAC-CPL-BP-AS350/355/EC130-1000	Compliance Plan – Eurocopter Model AS350/355/EC130 Series Helicopters – Installation of BearPaw Model BP350 and BP130	B	DAR 310	May 11, 2011
ATS-1034-FTP-1000	EC130 B4 BearPaw Installation - Flight Test Plan	NC	DAR 310	Apr 14, 2011
ATS-1034-FTR-1000	EC130 B4 BearPaw Installation - Flight Test Report	NC	DAR 310	May 04, 2011
ATS-1034-STR-1000	Structural Substantiation – Helitowcart BearPaw Model BP130	NC	DAR 310	May 04, 2011
HTC-314-0031-00	BearPaw Model BP130 – Installation Instructions - EC130 B4 Helicopters	A	DAR 310	May 04, 2011

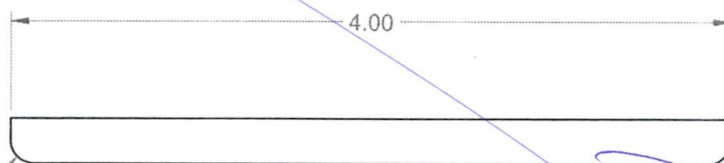
## 2.0 MASTER DRAWINGS

Drawings #	Title	Revision Status	Approval by	Date
<del>314-0002-15</del> (VNR084)	BearPaw – Iceblade	A R01	DAR 310	<del>Apr 24, 2006</del> Apr 24, 2006
<del>314-0004-15</del> (VNR085)	BearPaw – Iceblade Threaded Rod	A R01	DAR 310	<del>Apr 24, 2006</del> Apr 24, 2006
314-0005-15 (VNR086)	BearPaw – Iceblade Assembly	A (R01)	DAR 310	<del>Apr 24, 2006</del> Apr 24, 2006
314-0007-15 (VNR089)	Bearpaw – Slotted Clip Support	B (R04)	DAR 310	<del>July 31, 2006</del> July 31, 2006
314-0015-01 (VNR089)	Filler Block 1/8"	A	DAR 310	<del>Aug 8, 2006</del> Aug 8, 2006
112-0005-00	BearPaw BP130 – Assembly	A	DAR 310	May 04, 2011
314-0024-01	BearPaw - BP130 Pad	A	DAR 310	May 04, 2011
314-0025-15	BP130 - L Shaped Clip	A	DAR 310	May 04, 2011
314-0026-15	BP130 - U Shaped Clip	A	DAR 310	May 04, 2011

Do NOT  
CHANGE  
DATE!  
LEAVE AS  
IT WAS  
MISTAKE  
TO CROSS  
OFF! DR

Now Rev. B  
2017.06.02 / NR

Round corners  
after assembly  
Typ.

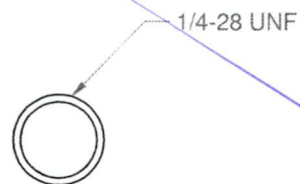


Note :  
Raw material specification :  
Stainless steel 304 annealed  
Rod

<b>TOLERANCES</b>		<b>Titre / Title</b> Bearpaw - Iceblade		<b>Matériel / Material:</b> See Note	
1/X ± 1/32"		Dessiné par / Drawing by: G. Lapointe	Date: (yyyy-mm-dd) 2006-04-24	Format: A	Echelle / Scale: 1 : 1
X.XX ± 0.010"		Verifié par / Checked by:	Date: (yyyy-mm-dd)	Numéro dessin / Drawing Number: VNR084	Page #: 1 de 1
X.XXX ± 0.005"		Approuvé par / Approved by: <i>S. Barthelemy</i>	Date: (yyyy-mm-dd) 2011-05-27	Numéro de pièce / Part Number: 314-0002-15-A	Rev.#: R1
ANGLE ± 1°		PROJECTION:			Rev.#: A

Rev.	Description	Date	By
R1	Initial issue	03-08-06	G.L.

314-0002-15 A



Break corner  
(Sanding)  
Typ.

*See Rev 2011 05 27*

Note :  
Raw material specification :  
Stainless steel 304 annealed  
Threaded rod 1/4-28 UNF



**Vanair inc.**  
860, Marie-Victorin  
St-Nicolas, Lévis (Québec)  
Canada, G7A 3S9  
Tél. : (418) 561-4512  
Fax : (418) 836-2291  
[www.helitowcart.com](http://www.helitowcart.com)

THIS DOCUMENT IS  
PROPERTY OF VANAIR  
INC. WRITTEN  
PERMISSION FROM  
VANAIR INC. SHALL BE  
OBTAINED PRIOR TO  
COPYING, USING OR  
MODIFYING.

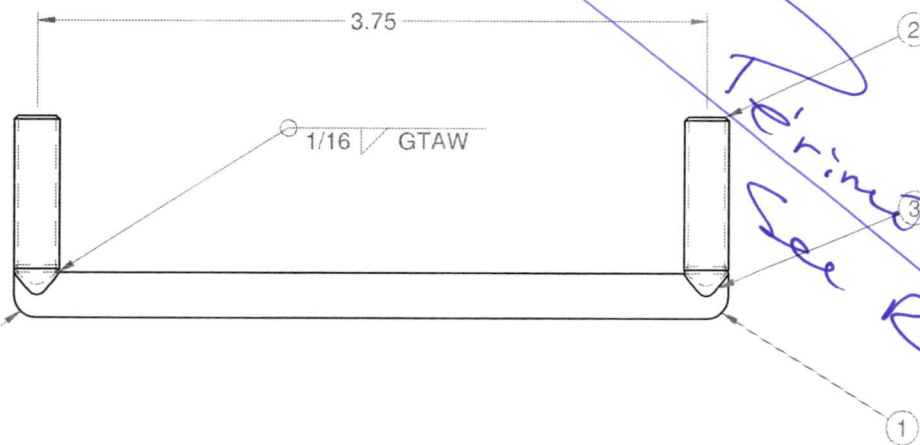
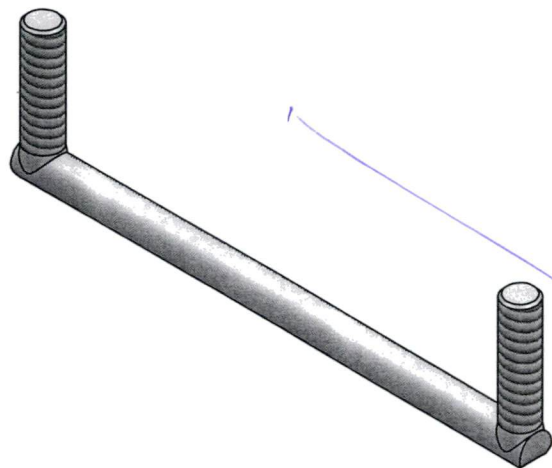
<b>TOLERANCES</b>		<b>Titre / Title</b> Bearpaw - Iceblade threaded rod		<b>Matériel / Material:</b> See Note	
1/X ± 1/32"		<b>Dessiné par / Drawing by:</b> G. Lapointe	<b>Date:</b> (yyyy-mm-dd) 2006-04-24	<b>Format:</b> A	<b>Échelle / Scale:</b> N/A
X.XX ± 0.010"		<b>Vérifié par / Checked by:</b>	<b>Date:</b> (yyyy-mm-dd)	<b>Numéro dessin / Drawing Number:</b> VNR085	<b>Page #:</b> 1 de 1
X.XXX ± 0.005"		<b>Approuvé par / Approved by:</b> <i>D. Babin</i>	<b>Date:</b> (yyyy-mm-dd) 2011 05 27	<b>Numéro de pièce / Part Number:</b> 314-0004-15-A	<b>Rev.#:</b> R1
ANGLE ± 1°		<b>PROJECTION:</b>			

R1	Initial issue	03-08-06	G.L.
Rev.	Description	Date	By

314-0004-15-A



N°	Qty:	Description	Doc #
1*	1	Bearpaw - Iceblade	314-0002-15-A
2*	2	Bearpaw - Iceblade threaded rod	314-0004-15-A
3*	2	Filler Material AWS A-5.9 / ASME SFA-5.9	MGSS308L



Round corners  
after assembly  
Typ.

		<b>Vanair inc.</b> 860, Marie-Victorin St-Nicolas, Lévis (Québec) Canada, G7A 3S9 Tél. : (418) 561-4512 Fax : (418) 836-2291 <a href="http://www.helitowcart.com">www.helitowcart.com</a>		THIS DOCUMENT IS PROPERTY OF VANAIR INC. WRITTEN PERMISSION FROM VANAIR INC. SHALL BE OBTAINED PRIOR TO COPYING, USING OR MODIFYING.	
		Titre / Title: <b>Bearpaw - Iceblade assembly</b>			
Dessiné par / Drawing by: <b>G. Lapointe</b>		Date: (yyyy-mm-dd) <b>2006-04-24</b>	Format: <b>A</b>	Echelle / Scale: <b>N/A</b>	Page #: <b>1 de 1</b>
Vérifié par / Checked by: <b>D. Bataillon</b>		Date: (yyyy-mm-dd) <b>2011-05-27</b>	Numéro dessin / Drawing Number: <b>VNR086</b>		Rev. #: <b>R1</b>
Approuvé par / Approved by: <b>D. Bataillon</b>		Date: (yyyy-mm-dd) <b>2011-05-27</b>	Numéro de pièce / Part Number: <b>314-0005-15-A</b>		Rev. #: <b>A</b>

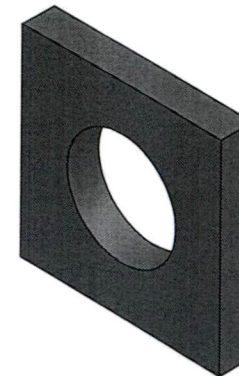
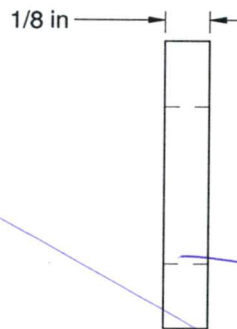
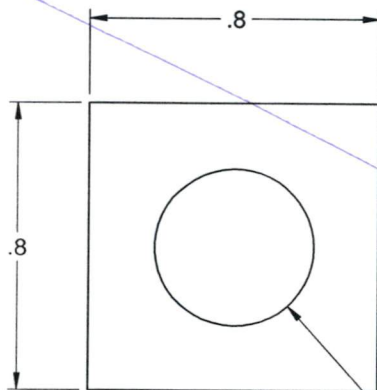
#### TOLERANCES

1/X ± 1/32"  
 X.XX ± 0.010"  
 X.XXX ± 0.005"  
 ANGLE ± 1°

PROJECTION:

Rev.	Description	Date	By
R1	Initial issue	03-08-06	G.L.

314-0005-15 A



Ø 7/16 in



**AMEC Usinage inc.**  
110, des Grand-Lacs  
Saint-Augustin (Québec)  
Canada, G3A 2K1  
Tél. : (418) 878-4133  
Fax : (418) 878-2536  
www.amecusinage.com

CE DOCUMENT EST LA  
PROPRIÉTÉ DE AMEC  
USINAGE INC. IL NE DOIT  
PAS ÊTRE DÉVOILÉ, UTILISÉ  
OU REPRODUIT EN TOUT OU  
EN PARTIES SANS  
L'AUTORISATION ÉCRITE DE  
AMEC USINAGE INC.

# TOLERANCES

1/X ± 1/32"  
X.XX ± 0.010"  
X.XXX ± 0.005"  
ANGLE ± 1°

PROJECTION:


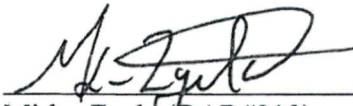
Titre / Title		Matériel / Material:	
Bearpaw - Filler Block 1/8"		UHMW	
Dessiné par / Drawing by:	Date: (yyyy-mm-dd)	Format:	Échelle / Scale:
G. Lapointe	2006-09-06	A	N/A
Vérifié par / Checked by:	Date: (yyyy-mm-dd)	Numéro dessin / Drawing Number:	Page #:
		VNR104	1 de 1
Approuvé par / Approved by:	Date: (yyyy-mm-dd)	Numéro de pièce / Part Number:	Rev. #:
<i>D. Bédard</i>	2011 05 23	314-0015-01-A	R01

Rev.	Description	Date	Par
R01	Initial issue	06-09-06	G.L.

314-0015-01 A

CAN - STC



<b>Transport Canada</b>		<b>Date:</b> August 28, 2013
<b>Statement of Conformity With Certification Basis</b>		<b>Approval #</b> Q-SH06-24 Issue #4
<b>Model No</b>	<b>Type of equipment</b>	
R44, R44 II, R66, AS 350 D, AS 350 B, AS 350 B1, AS 350 B2, AS 350 B3, AS 350 BA, EC 130 B4, AS 355 E, AS 355 F, AS 355 F1, AS 355 F2, AS 355 N	BearPaw	
<p align="center"><b>Statement of Conformity</b></p> <p>As the applicant to the modification approved under the STC Q-SH06-24 Issue #4, I hereby declare that the modifications listed above and defined in the following Master Document Lists:</p> <p>For the R44 Series and R66: HTC-MDL-BP-R44-1000, Revision D dated August 28, 2013</p> <p>For the AS350 and AS355 Series: HTC-MDL-BP-AS350/355-1000, Revision G dated December 21, 2012</p> <p>For the EC130 - B4: HTC-MDL-BP-EC130-1000, Revision A dated May 13, 2011</p> <p>are conform to the best of my knowledge with its certification basis established by the Minister.</p> <p>Signature:  Mirko Zgela (DAR#310)</p> <p>On behalf of: <u>Helitowcart</u></p> <p>Position title: <u>President</u></p> <p>Company/Organization: <u>Aviatech Technical Services Inc</u></p>		



Transport Canada Transports Canada

Department of Transport

# Supplemental Type Certificate

COPIE ORIGINALE  
DANS DMF-BP44  
PB

This approval is issued to:

Helitowcart (Vanair Inc.)  
877A, Alphonse-Desrochers  
St-Nicholas, Lévis, Québec  
Canada G7A 5K6

Number: SH06-24

Issue No.: 4

Approval Date: August 17, 2006

Issue Date: October 10, 2013

Responsible Office:

Québec

Aircraft/Engine Type or Model:

See Continuation Sheet on Page 2 of 2

Canadian Type Certificate or Equivalent:

See Continuation Sheet on Page 2 of 2

Description of Type Design Change:

Installation of Helitowcart BearPaw

Installation/Operating Data,  
Required Equipment and Limitations:

For the Robinson Models R44, R44 II and R66 Helicopters:

Installation of Helitowcart Bear Paw BP44 is to be performed in accordance with TC approved Helitowcart Master Document List Report: HTC-MDL-BP-R44-1000, Revision D dated August 28, 2013, or later Transport Canada approved revision.

The BearPaw must be installed in accordance with Helitowcart Document: 314-0011-00, BearPaw Model BP44, Installation Instructions - R44/R66, Revision E dated August 09, 2013 or later Transport Canada approved revision.

See Continuation Sheet Page 2 of 2



**Conditions:** This approval is only applicable to the type/model of aeronautical product specified therein. Prior to incorporating this modification, the installer shall establish that the interrelationship between this change and any other modification(s) incorporated **will not** adversely affect the airworthiness of the modified product.

Jean-Pierre Francoeur  
For Minister of Transport

Canada





## (Continuation Sheet)

Number: SH06-24 Issue 4

NOTE: THIS ADDENDUM SHALL REMAIN PART OF THE CERTIFICATE REFERRED TO THEREIN.

**Installation/Operating Data,  
Required Equipment and Limitations (Cont'd):****For the Eurocopter (formerly Aerospatiale) AS350 and AS355 Series Helicopters:**

Installation of Helitowcart Bear Paw BP350 is to be performed in accordance with TC approved Helitowcart Master Document List Report: HTC-MDL-BP-AS350/355-1000, Revision F dated April 8, 2010, or later Transport Canada approved revision.

The BearPaw must be installed in accordance with Helitowcart Document: 314-0020-00-E, BearPaw Model BP350, Installation Instructions - AS350/355, Revision F dated December 21, 2012 or later Transport Canada approved revision.

**For the Eurocopter EC 130 Helicopters:**

Installation of Helitowcart Bear Paw BP130 is to be performed in accordance with TC approved Helitowcart Master Document List Report: HTC-MDL-BP-EC130-1000, Revision A dated May 13, 2011, or later Transport Canada approved revision.

The BearPaw must be installed in accordance with Helitowcart Document: 314-0031-00-A, BearPaw Model BP130, Installation Instructions - EC130, Revision A dated May 04, 2011 or later Transport Canada approved revision.

Fleet Eligibility List		
Make	Model	Type Certificate Data Sheet
Robinson	R44	H-97
Robinson	R44 II	H-97
Robinson	R66	H-111
Eurocopter	AS 350 B	H-83
Eurocopter	AS 350 B1	H-83
Eurocopter	AS 350 B2	H-83
Eurocopter	AS 350 B3	H-83
Eurocopter	AS 350 BA	H-83
Eurocopter	AS 350 D	H-83
Eurocopter	EC 130 B4	H-83
Eurocopter	AS 355 E	H-87
Eurocopter	AS 355 F	H-87
Eurocopter	AS 355 F1	H-87
Eurocopter	AS 355 F2	H-87
Eurocopter	AS 355 N	H-87

- End -





Department of Transport

# Supplemental Type Certificate

This approval is issued to:

Helitowcart Inc.  
860 Marie-Victorin  
St-Nicholas, Lévis, Québec  
Canada G7A 3S9

Number: SH06-24

Issue No.: 3

Approval Date: August 17, 2006

Issue Date: July 7, 2011

Responsible Office:

Québec

Aircraft/Engine Type or Model:

See Continuation Sheet Page 2 of 2

Canadian Type Certificate or Equivalent:

See Continuation Sheet Page 2 of 2

Description of Type Design Change:

Installation of Helitowcart BearPaw

Installation/Operating Data,  
Required Equipment and Limitations:

For the Robinson Models R44 and R44 II Helicopters:

Installation of Helitowcart Bear Paw BP44 is to be performed in accordance with TC approved Helitowcart Inc. Master Document List, Report: HTC-MDL-BP-R44-1000, Revision C dated April 15, 2010, or later Transport Canada approved revision.

The BearPaw must be installed in accordance with Helitowcart Inc. Installation Instructions Document: "HTC-314-0011-00-D, BearPaw Model BP44, Installation Instructions - R44".

See Continuation Sheet Page 2 of 2

*2013 11 11  
DB  
No issue not.*



**Conditions:** This approval is only applicable to the type/model of aeronautical product specified therein. Prior to incorporating this modification, the installer shall establish that the interrelationship between this change and any other modification(s) incorporated **will not** adversely affect the airworthiness of the modified product.

Jean-Pierre Francoeur  
For Minister of Transport

Canada



NOTE: THIS ADDENDUM SHALL REMAIN PART OF THE CERTIFICATE REFERRED TO THEREIN.

**Installation/Operating Data,  
Required Equipment and Limitations (Cont'd):**

For the Eurocopter (formerly Aerospatiale) AS350 and AS355 Series Helicopters:

Installation of Helitowcart Bear Paw BP350 is to be performed in accordance with TC approved Helitowcart Inc. Master Document List, Report: HTC-MDL-BP-AS350/355-1000, Revision F dated April 8, 2010, or later Transport Canada approved revision.

The BearPaw must be installed in accordance with Helitowcart Inc. Installation Instructions Document: "HTC-314-0020-00-E, BearPaw Model BP350, Installation Instructions - AS350/355".

For the Eurocopter EC 130 Helicopters:

Installation of Helitowcart Bear Paw BP130 is to be performed in accordance with TC approved Helitowcart Inc. Master Document List, Report: HTC-MDL-BP-EC130-1000, Revision A dated May 13, 2011, or later Transport Canada approved revision.

The BearPaw must be installed in accordance with Helitowcart Inc. Installation Instructions Document: "HTC-314-0031-00-A, BearPaw Model BP130, Installation Instructions - EC 130".

Fleet Eligibility List		
Make	Model	Type Certificate Data Sheet
Robinson	R44	H-97
Robinson	R44 II	H-97
Eurocopter	AS 350 B	H-83
Eurocopter	AS 350 B1	H-83
Eurocopter	AS 350 B2	H-83
Eurocopter	AS 350 B3	H-83
Eurocopter	AS 350 BA	H-83
Eurocopter	AS 350 D	H-83
Eurocopter	EC 130 B4	H-83
Eurocopter	AS 355 E	H-87
Eurocopter	AS 355 F	H-87
Eurocopter	AS 355 F1	H-87
Eurocopter	AS 355 F2	H-87
Eurocopter	AS 355 N	H-87

— End —





Supplemental Type Certificate  
IMPORT

Number SR02432NY

This certificate issued to Helitowcart (Vanair Inc.)  
877A, Alphonse-Desrochers  
Saint-Nicholas, Lévis, Québec  
Canada G7A 5K6

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified herein meets the airworthiness requirements of \* of the \* Regulations.

Original Product - Type Certificate Number: \*  
Make: \*  
Model: \*  
\* See attached FAA Approved Model List (AML) No. SR02432NY for the list of approved aircraft models, applicable airworthiness regulations, and required documents.

Description of Type Design Change:

1. Installation of Helitowcart Bear Paw Models BP350, BP44 or BP130 in accordance with Helitowcart Master Document Lists as specified in AML SR02432NY.
2. Instructions for Continued Airworthiness documents as specified in AML SR02432NY are required with this installation.

Limitations and Conditions:

1. A copy of this certificate and FAA AML No. SR02432NY must be maintained as part of the permanent records of this modified aircraft.
2. The Installer must determine whether this design change is compatible with previously approved modifications.
3. If the holder agrees to permit another person to use this certificate to alter a product, the holder must give the other person written evidence of that permission.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked or a termination date is otherwise established by the Administrator of the Federal Aviation Administration

Date of application: March 26, 2007

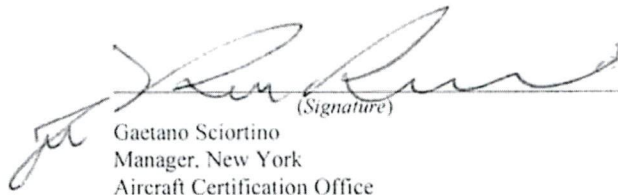
Date reissued:

Date of issuance: July 20, 2007

Date amended: January 14, 2013, June 3, 2014



By direction of the Administrator

  
(Signature)  
Gaetano Sciortino  
Manager, New York  
Aircraft Certification Office

(Title)

Added BP44  
for R66  
Original in  
BP44 DMR

NEW ENGLAND REGION  
NEW YORK AIRCRAFT CERTIFICATION OFFICE  
1600 STEWART AVENUE, SUITE 410  
WESTBURY, NEW YORK 11590

**INFORMATION CONCERNING YOUR RESPONSIBILITY AS HOLDER OF A  
SUPPLEMENTAL TYPE CERTIFICATE ISSUED TO A CANADIAN APPLICANT**

This STC is official indications of FAA approval of your installation and may be used to authorize identical installation on other aircraft of the same model, subject to the limitation noted in the STC. It may be transferred, or otherwise made available to another party by means of a licensee arrangement; however, you are requested to advise this office when you transfer or grant licensee rights to the STC in order that we may take the necessary recording or reissuance action.

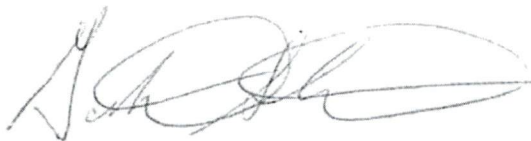
If you plan to manufacture and sell parts for installation on type certificated aircraft, please review FAR 21.502, which is applicable to parts imported into the U.S.

A copy of the STC and required documents should accompany each kit and installation. Also, your attention is directed to the limitations and conditions specified in the STC.

As recipient of this approval, except as provided in FAR21.3(d), you are required to report any failure, malfunction, or defect in any product or part manufactured by you that you have determined has resulted or could result in any of the occurrences listed in FAR 21.3(c).

The report should be communicated initially by telephone and subsequently in writing to the Manager, New York Aircraft Certification Office, telephone (516) 228-7300, mailing address: 1600 Stewart Avenue, Suite 410, Westbury, New York 11590. This first contact should take place within 24 hours after it has been determined that the failure required to be reported has occurred.

FAA Form 8010-4, Malfunction or Defect Report, or any other appropriate format is acceptable in transmitting the required details.



Gaetano Sciortino  
Manager  
New York Aircraft Certification Office



FAA APPROVED MODEL LIST (AML) NO. SR02432NY  
HELITOWCART (VANAIR, INC.)  
FOR  
INSTALLATION OF BEAR PAWS

Original Issue Date: July 20, 2007  
Amended Date: June 3, 2014

PART	REGULATION	MAKE	MODEL	TCDS	REQUIRED DOCUMENTATION			AML AMENDMENT DATE
					MASTER DOCUMENT LIST	INSTALLATION INSTRUCTIONS	INSTRUCTIONS for CONTINUED AIRWORTHINESS	
27	Federal Aviation	Airbus Helicopters	AS350B, B1 B2, B3, BA, D, D1	H9EU	Helitowcart Inc. Master Document List, Report no. HTC-MDL-BP- AS350/355-1000 Rev. G, approved on December 21, 2012 or later Transport Canada approved revision.	Helitowcart Inc. Installation Instructions - AS350/355, Bear Paw Model BP350, document no. 314-0020-00-E, Rev. F, approved on December 21, 2012 or later Transport Canada approved revision.	Contained within Installation Instructions, page 8 of document no. 314- 0200-00-E, Revision F.	June 3, 2014
27	Federal Aviation	Airbus Helicopters	EC 130B4	H9EU	Helitowcart Inc. Master Document List, Report no. HTC-MDL-BP- EC130-1000 Rev A, approved on May 13, 2011 or later Transport Canada approved revision.	Helitowcart Inc. Installation Instructions – EC130, Bear Paw Model BP130, document no. 314- 0031-00-A, Rev. A, approved May 4, 2011 or later Transport Canada approved revision	Contained within Installation Instructions, page 6 of document no. 314- 0031-00-A, Revision A.	June 3, 2014
27	Federal Aviation	Airbus Helicopters	AS355E, F, F1, F2, N	H11EU	Helitowcart Inc. Master Document List, Report no. HTC-MDL-BP- AS350/355-1000 Rev. G, approved on December 21, 2012 or later Transport Canada approved revision.	Helitowcart Inc. Installation Instructions - AS350/355, Bear Paw Model BP350, document no. 314-0020-00-E, Rev. F, approved on December 21, 2012 or later Transport Canada approved revision.	Contained within Installation Instructions, page 8 of document no. 314- 0200-00-E, Revision F.	June 3, 2014
27	Federal Aviation	Robinson Helicopter Company	R44, R44 II	H11NM	Helitowcart Inc. Master Document List, Report no. HTC-MDL-BP- R44-1000 Rev. D, approved on August 28, 2013 or later Transport Canada approved revision.	Helitowcart Inc. Installation Instructions - R44/R66, Bear Paw Model BP44, document no. 314-0011-00, Rev. E, approved on August 9, 2013 or later Transport Canada approved revision.	Contained within Installation Instructions, page 6 of document no. 314- 0011-00, Rev. E.	June 3, 2014


FAA APPROVED MODEL LIST (AML) NO. SR02432NY  
HELITOWCART (VANAIR, INC.)  
FOR  
INSTALLATION OF BEAR PAWS

Original Issue Date: July 20, 2007

Amended Date: June 3, 2014

PART	REGULATION	MAKE	MODEL	TCDS	REQUIRED DOCUMENTATION			AML AMENDMENT DATE
					MASTER DOCUMENT LIST	INSTALLATION INSTRUCTIONS	INSTRUCTIONS for CONTINUED AIRWORTHINESS	
27	Federal Aviation	Robinson Helicopter Company	R66	R00015LA	Helitowcart Inc. Master Document List, Report no. HTC-MDL-BP- R44-1000 Rev. D, approved on August 28, 2013 or later Transport Canada approved revision.	Helitowcart Inc. Installation Instructions - R44/R66, Bear Paw Model BP44, document no. 314-0011-00, Rev. E, approved on August 9, 2013 or later Transport Canada approved revision.	Contained within Installation Instructions, page 6 of document no. 314- 0011-00, Rev. E.	June 3, 2014

FAA Approved: 

 Gaetano Sciortino  
Manager, New York  
Aircraft Certification Office

EURO

INST.

**1- Install Shrink:**

- Prepare Heat Shrink:

BP44 & BP66:

Use 1.5" wide shrink. Cut to 5.5" length.

BP350 & BP130:

Use 1.5" wide shrink. Cut to 6.75" length.

- Insert U clips into shrink.
- Set U clips standing or on their side on aluminum sheet on cookie pan.
- Heat in oven at 350F for approx. 5 minutes or until shrink is tightly resting against stainless steel on its whole surface.

Nature modifications: Complete update of instruction

*P. Barilau 2017 06 01*

314-0016-05-C BearPaw Heat Shrink Insall

t: 1-418-561-4512, 877A Alphonse-Desrochers, Saint-Nicolas, Levis, Quebec, Canada G7A 5K6

[www.helitowcart.com](http://www.helitowcart.com)

[info@helitowcart.com](mailto:info@helitowcart.com)

Page 1/1



SPCCS



## Master Document List

Helitowcart

**Eurocopter Model EC 130 B4 Helicopters**  
**Installation of BearPaw Model BP130**

**Report: HTC-MDL-BP-EC130-1000 (Rev A)**

APPROVED BY:

Mirko Zgela  
Design Approval Representative DAR #310

DATE: MAY 13, 2011



Revision	Revision Date	Revision of Entry	Entered by
A	May 13, 2011	Initial issue	N/A



## 1.0 MASTER DOCUMENTS

Document #	Title	Revision Status	Approval by	Date
AAC-CPL-BP-AS350/355/EC130-1000	Compliance Plan – Eurocopter Model AS350/355/EC130 Series Helicopters – Installation of BearPaw Model BP350 and BP130	B	DAR 310	May 11, 2011
ATS-1034-FTP-1000	EC130 B4 BearPaw Installation - Flight Test Plan	NC	DAR 310	Apr 14, 2011
ATS-1034-FTR-1000	EC130 B4 BearPaw Installation - Flight Test Report	NC	DAR 310	May 04, 2011
ATS-1034-STR-1000	Structural Substantiation – Helitowcart BearPaw Model BP130	NC	DAR 310	May 04, 2011
HTC-314-0031-00	BearPaw Model BP130 – Installation Instructions - EC130 B4 Helicopters	A	DAR 310	May 04, 2011

## 2.0 MASTER DRAWINGS

Drawings #	Title	Revision Status	Approval by	Date
314-0002-15 (VNR084)	BearPaw – Iceblade	A R01	DAR 310	Apr 24, 2006
314-0004-15 (VNR085)	BearPaw – Iceblade Threaded Rod	A R01	DAR 310	Apr 24, 2006
314-0005-15 (VNR086)	BearPaw – Iceblade Assembly	A (R01)	DAR 310	Apr 24, 2006
314-0007-15 (VNR089)	Bearpaw – Slotted Clip Support	B (R04)	DAR 310	July 31, 2006
314-0015-01 (VNR092)	Filler Block 1/8"	A	DAR 310	Aug 8, 2006
112-0005-00	BearPaw BP130 – Assembly	A	DAR 310	May 04, 2011
314-0024-01	BearPaw - BP130 Pad	A	DAR 310	May 04, 2011
314-0025-15	BP130 - L Shaped Clip	A	DAR 310	May 04, 2011
314-0026-15	BP130 - U Shaped Clip	A	DAR 310	May 04, 2011

DO NOT CHANGE DATE! LEAVE AS IS! IT WAS MISTAKE TO CROSS IT OFF! DR

Now Rev. B  
2017.06.02 / NR



### 3.0 REFERENCE DOCUMENTS

Document #	Title	Revision Status	Approval by	Date
314-0009-01-A	Ultra High Molecular Weight Polyethylene – Typical Properties	A	N/A	May 24, 2006
314-0008-01-A	Material Properties - UHMW TIVAR	A	N/A	May 24, 2006
314-0017-05-A	Heat Shrink Specifications	A	N/A	Sept 6, 2006



Re: AAC-CPL- BP. AS350/355/EC130-1000



\*NON DISPONIBLE.  
CONTACTER AVIATECH POUR LE  
CONSULTER.

DR

2011 12 10

Trois-Rivières, le 18 octobre 2011

Madame Nathalie Barbeau  
Helitowcart Inc.  
860, Marie-Victorin  
St-Nicholas, Lévis (Québec)  
G7A 3S9

**Objet : TCCA STC SH06-24 Issue #3**

Chère Nathalie,

Vous trouverez ci-joint le certificat original SH06-24, Révision #3, qui inclus le modèle EC130-B4.

Vous avez donc en votre possession tous les documents relatifs à cette révision. À l'exception du document AAC-CPL-BP-AS350/355/EC130-1000.

Ce document demeure la propriété de Aviatech. Une copie de ce document est disponible pour consultation par TCCA

En espérant le tout conforme, veuillez agréer Madame Barbeau, nos salutations distinguées.

MIRKO NE VEUT PLUS ME  
REMETTRE COPIE DE CE  
DOCUMENT. J'AI DONC  
OBTENU LETTRE CONFIRMANT  
QUE DOC. EST ACCESSIBLE  
POUR CONSULTATION.

Mirko Zgela  
Président

NOTE: J'ai ce doc POURTANT  
POUR BP44 + BP350!

DR



3005, rue Lindbergh  
Trois-Rivières, Québec, G9A 5E1  
Tel: (819) 601-8049 Fax: (819) 377-7928  
Courriel: info@ats-ast.com  
Ste Web : www.ats-ast.com

ATS-1034-FTP-1000 Rev NC

**TCCA – Simple External Modification**  
**EC130 B4 BearPaw Installation - Flight Test Plan**

Aircraft Type: Eurocopter EC130 B4 Registration / Ser No: C-FXSH / 4968

Modification Description: Installation of Helitowcart BearPaw as per STC: SH06-24 Issue #3

Modification Drawing Number: Installation conforms to: HTC-MDL-BP-EC130-10000 Rev NC  
Installation is performed as per: HTC-314-0031-00-A, "BearPaw Model BP130 – Installation Instructions – EC130 Helicopter", Rev A.

Date of Flight: \_\_\_\_\_ Location of Flight: CYQB – Capital Helicopter Inc.

Test Weight: \_\_\_\_\_ Test CG: \_\_\_\_\_

Configuration (List All External Mods): Configuration #1: Clean helicopter (Baseline)  
Configuration #2: BearPaw installed as per HTC-314-0020-00-A, HTC-314-0031-00-A, "BearPaw Model BP130 – Installation Instructions – EC130 Helicopter", Rev A.

Note: Two flights will be required, one clean to be used as baseline the other with the BearPaw installed.

**TEST RESULTS**

Test	Characteristics to Look For	Initial if Satisfactory
527.171 – Stability General	Perform at least three take/landing from a soft soils/snow to ensure that the bear paw does not create any abnormal conditions.	
527.309 – Design Limitation (c) & (d) 527.143 – Controllability and Maneuverability	Perform forward rearward and sideward flight (left & right) at maximum speed. Note the following: <ul style="list-style-type: none"> <li>- Abnormal vibration of the airframe/Landing gear</li> <li>- Abnormal vibration of BearPaw</li> <li>- Large displacements of BearPaw/Landing gear</li> <li>- Controllability of the helicopter</li> </ul>	
527.251 - Vibration	Perform forward rearward and sideward flight (left & right) at maximum speed. Note the following: <ul style="list-style-type: none"> <li>- Abnormal vibration of the airframe/landing gear</li> <li>- Abnormal vibration of BearPaw</li> <li>- Large displacements of BearPaw/Landing Gear</li> <li>- Controllability of the helicopter</li> </ul>	

527.173 Static Longitudinal Stability  
 527.175 Demonstration of Static Longitudinal Stability – (Cruise)

**Cruise:** 3000 Ft PAIt

Set power to achieve a trim condition at 0.9Vh. Note the following:

Rotor RPM: \_\_\_\_\_  
 Q: \_\_\_\_\_  
 N1: \_\_\_\_\_  
 N2: \_\_\_\_\_

The collective stick should be fixed in that position; usually by applying sufficient friction to ensure that it is not inadvertently moved.

Increased or decreased in about 10-knot increments, stabilizing on each speed and recording the longitudinal cyclic position, then decreasing speed through the same altitude band.

Speed	Speed (IAS)	Cyclic Position (1)
+10		
+10		
+10		
Vh		
-10		
-10		
-10		

Cyclic position from reference at (Vh).

Can trim conditions can be easily achieved.

**Climb:** 2500 Ft PAIt

Set power to achieve a trim condition at 0.9Vh. Note the following:

Rotor RPM: \_\_\_\_\_  
 Q: \_\_\_\_\_  
 N1: \_\_\_\_\_  
 N2: \_\_\_\_\_

The collective stick should be fixed in that position; usually by applying sufficient friction to ensure that it is not inadvertently moved.

Decrease climb speed in about 10-knot increments, stabilizing on each speed and recording the longitudinal cyclic position, then decreasing speed through the same altitude band. Target alt 3000 ft.

Speed	Speed (IAS)	Cyclic Position (1)	Climb Rate
Vh			
-10			
-10			
-10			

Cyclic position from reference at (Vh).

Can trim conditions in climb can be easily achieved.

**Autorotation:** 3500 Ft PAlt

Set power to achieve a trim condition at  $0.9V_h$ . Note the following:

Rotor RPM: \_\_\_\_\_

Q: \_\_\_\_\_

N1: \_\_\_\_\_

N2: \_\_\_\_\_

Initiate an autorotation increased or decreased autorotation speed in about 10-knot increments, stabilizing on each speed and recording the longitudinal cyclic position, then decreasing speed through the same altitude band. Target alt 3000 ft.

Speed	Speed (IAS)	Cyclic Position (1)	Decent Rate
+10			
+10			
$V_h$			
-10			
-10			

Cyclic position from reference at ( $V_h$ ).

Can trim conditions in climb can be easily achieved.



527.177 Static Directional Stability	<p>Static Directional Stability</p> <p>Climb:</p> <p>With MCP (Maximum Continuous Power) established, initiate a climb at 70 KIAS.</p> <p>Apply L/H and R/H rudder input to approximately 10 deg sideslip. The helicopter directional stability must be positive steadily increasing directional control input for increasing angles of sideslip.</p> <p>Repeat the above maneuver at 10 KIAS increment up to 95 KIAS.</p> <p>Cruise:</p> <p>With the power set for a cruise at 60 KIAS. Apply L/H and R/H rudder input to approximately 10 deg sideslip. The helicopter directional stability must be positive steadily increasing directional control input for increasing angles of sideslip.</p> <table border="1" data-bbox="540 772 1133 1171"> <thead> <tr> <th>Speed</th> <th>Speed (IAS)</th> <th>Sideslip positive return</th> </tr> </thead> <tbody> <tr><td>60</td><td></td><td></td></tr> <tr><td>+10</td><td></td><td></td></tr> <tr><td>+10</td><td></td><td></td></tr> <tr><td>+10</td><td></td><td></td></tr> <tr><td>+10</td><td></td><td></td></tr> <tr><td>+10</td><td></td><td></td></tr> <tr><td>+10</td><td></td><td></td></tr> </tbody> </table> <ul style="list-style-type: none"> <li>- Note any abnormal vibrations.</li> <li>- Note any abnormal degradation in directional stability.</li> </ul>	Speed	Speed (IAS)	Sideslip positive return	60			+10			+10			+10			+10			+10			+10			
Speed	Speed (IAS)	Sideslip positive return																								
60																										
+10																										
+10																										
+10																										
+10																										
+10																										
+10																										
527.629 - Flutter 527.143 – Controllability and Maneuverability	Perform a shallow dive at 1.1 VNE. Note the following <ul style="list-style-type: none"> <li>- Abnormal vibration of the airframe, landing gear and rotor blade</li> <li>- Abnormal vibration of BearPaw/Landing Gear</li> <li>- Large displacements of BearPaw</li> <li>- Controllability of the helicopter</li> </ul>																									

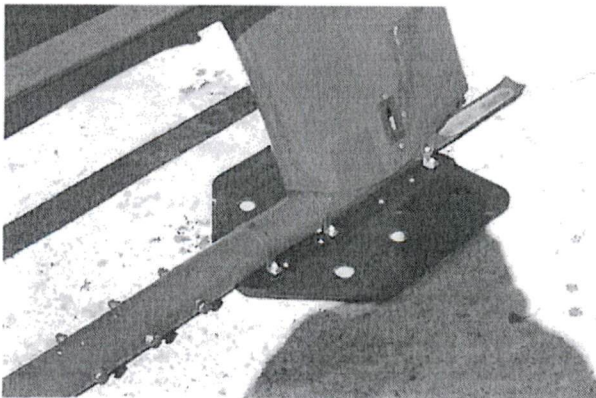
I hereby attest that I have flown (Model) Model \_\_\_\_\_ (Registration) \_\_\_\_\_ (Serial Number) \_\_\_\_\_ with the above modification(s) installed and that this aircraft exhibited the flight characteristics and performance of a standard EC130 when the modified with the above modification.

Pilot I/C Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Pilot's Name: \_\_\_\_\_ Pilot's License No: \_\_\_\_\_

If applicable - DAR's Signature \_\_\_\_\_ DAR's /No: \_\_\_\_\_

**TCCA – Simple External Modification**  
**EC130 B4 BearPaw Installation - Flight Test Report**

Aircraft Type:	Eurocopter EC130 B4	Registration / Ser No:	C-FXSH / 4968
Modification Description:	Installation of Helitowcart BearPaw as per STC: SH06-24 Issue #3		
Modification Drawing:	<p>Installation conforms to: HTC-MDL-BP-EC130-10000 Rev NC</p> <p>Installation is performed as per: HTC-314-0031-00-A, "BearPaw Model BP130 – Installation Instructions – EC130 Helicopter", Rev A.</p> <p><b>Note:</b> Conformity inspection performed by DAR #310 prior to flight. Small adjustments were made to bolt length to suit the installation. Installation drawing annotated to reduce by one dash the bolt length on a few areas. See figure (1) for the BearPaw installed on the helicopter.</p>		
			
Figure (1) – EC130 BearPaw installed on Test Helicopter			
Date of Flight:	March 24, 2011	Location of Flight:	CYQB – Capital Helicopter Inc.
Test Weight:	4680 lbs	Test CG:	133.2 in
Configuration (List All External Mods):	<p>Configuration #1: Clean helicopter (Baseline)</p> <p>Configuration #2: BearPaw installed as per HTC-314-0031-00-A, "BearPaw Model BP130 - Installation Instructions – EC130 Helicopter", Rev A.</p>		
<p>Note: Two flights were done:</p> <p>Flight #1 – Configuration #2 (BearPaw installed) – 0.8 hrs</p> <p>Flight #2 – Configuration #1 (Baseline) – 0.6 hrs</p>			

**TEST RESULTS**

Test	Characteristics to Look For	Initial if Satisfactory
527.171 – Stability General	<p>Performed at least three take-off and landings from a soft soils/snow to ensure that the bear paw does not create any abnormal conditions.</p> <p><b>Results:</b></p> <p>Take-off and landing were performed in muddy soil on the runway side. No restriction created by the BearPaw. No difference between the baseline and the BearPaw configured aircraft.</p>	

527.309 – Design Limitation (c) & (d)  527.143 – Controllability and Maneuverability	Perform forward rearward and sideward flight (left & right) at maximum speed. Note the following: <ul style="list-style-type: none"><li>- Abnormal vibration of the airframe/Landing gear</li><li>- Abnormal vibration of BearPaw</li><li>- Large displacements of BearPaw/Landing gear</li><li>- Controllability of the helicopter</li></ul> <b>Results:</b>  Performed side way flight on runway 24 up to 17KIAS ground speed and 10 KIAS rearward flight. Sideway flight to L/H side more difficult to control but no difference between the baseline and the BearPaw configured aircraft. No abnormal vibrations.																									
527.251 - Vibration	Perform forward rearward and sideward flight (left & right) at maximum speed. Note the following: <ul style="list-style-type: none"><li>- Abnormal vibration of the airframe/landing gear</li><li>- Abnormal vibration of BearPaw</li><li>- Large displacements of BearPaw/Landing Gear</li><li>- Controllability of the helicopter</li></ul> <b>Results:</b>  Performed side way flight on runway 23 up to 17KIAS ground speed and 10 KIAS rearward flight. Sideway flight to L/H side more difficult to control but no difference between the baseline and the BearPaw configured aircraft from a vibration point of view.																									
527.173 Static Longitudinal Stability  527.175 Demonstration of Static Longitudinal Stability – (Cruise)	<b>Cruise: 2000 Ft PAlt</b>  Set power to achieve a trim condition at 0.9Vh. Note the following:  <b>Rotor RPM: 393</b> <b>Q: 80%</b> <b>N1: 91.9 %</b> <b>N2: 393 (Match to RPM)</b>  The collective stick should be fixed in that position; usually by applying sufficient friction to ensure that it is not inadvertently moved. Increased or decreased in about 10-knot increments, stabilizing on each speed and recording the longitudinal cyclic position, then decreasing speed through the same altitude band.  <b>Results:</b>  <b>Cyclic travel on the ground with rotor not turning:</b> Cyclic Full Forward: 10.6 Cyclic Full Aft: 15.3 <table><tr><th>Speed</th><th>Speed (IAS)</th><th>Cyclic Position BearPaw</th><th>Cyclic Position (1) Baseline</th></tr><tr><td>+10</td><td>95</td><td>12.4</td><td>12.3</td></tr><tr><td>+10</td><td>105</td><td>12.0</td><td>12.1</td></tr><tr><td>+10</td><td>115</td><td>11.8</td><td>11.7</td></tr><tr><td>Vh</td><td>125</td><td>11.6</td><td>11.5</td></tr><tr><td>-10</td><td>135</td><td>11.2</td><td>11.1</td></tr></table>  The two configurations produced similar stick gradient of 0.30 in/10 knots with positive cyclic forward producing a increase in speed. Note: Tape measure not sensitive enough for characterize the difference created by the BearPaw. Most likely, no differences considering the BearPaw generated drag versus the size of the helicopter.	Speed	Speed (IAS)	Cyclic Position BearPaw	Cyclic Position (1) Baseline	+10	95	12.4	12.3	+10	105	12.0	12.1	+10	115	11.8	11.7	Vh	125	11.6	11.5	-10	135	11.2	11.1	
Speed	Speed (IAS)	Cyclic Position BearPaw	Cyclic Position (1) Baseline																							
+10	95	12.4	12.3																							
+10	105	12.0	12.1																							
+10	115	11.8	11.7																							
Vh	125	11.6	11.5																							
-10	135	11.2	11.1																							



527.173 Static  
Longitudinal Stability527.175  
Demonstration of  
Static Longitudinal  
Stability – (Cruise)

Cyclic position from reference at (Vh). 3.7" from full aft.

Can trim conditions can be easily achieved. Yes

**Climb:** 2000 Ft PAlt (Started 200 ft below until trim)

Set power to achieve a trim condition at 0.9Vh. Note the following:

**Rotor RPM: 393**

**Q: 80%**

**N1: 91.9 %**

**N2: 393 (Match to RPM)**

The collective stick should be fixed in that position; usually by applying sufficient friction to ensure that it is not inadvertently moved.

Decrease climb speed in about 10-knot increments, stabilizing on each speed and recording the longitudinal cyclic position, then decreasing speed through the same altitude band. Target alt 2000 ft.

Speed	Speed (IAS)	Cyclic Position (1)	Climb Rate
Vh	123	11.5	0 ft/min
-10	110	11.8	800 ft/min
-10	100	12.0	1200 ft/min
-10	90	12.25	1500 ft/min

Cyclic position from reference at (Vh). 3.7" from full aft.

Can trim conditions in autorotation can be easily achieved. Yes.

Stick gradient in climb with BearPaw measured at 0.22in/10 KIAS. Stick aft produced positive climb rate and reduction in speed.

**Autorotation:** 2500 Ft PAlt at 100 KIAS

**Rotor RPM: 393**

**Q: 52%**

**N1: 87.5 %**

**N2: 393 (Match to RPM)**

Initiate an autorotation increased or decreased autorotation speed in about 10-knot increments, stabilizing on each speed and recording the longitudinal cyclic position, then decreasing speed through the same altitude band. Target alt 2000 ft.

Speed	Speed (IAS)	Cyclic Position (1)	Decent Rate
100	100	13.0	3000 ft/min
90	90	13.2	2800 ft/min
80	80	13.25	2200 ft/min
70	70	13.3	1900 ft/min

Can trim conditions in climb can be easily achieved: Yes

Cyclic stick gradient approximately 0.1 in/10 KIAS in trim speed. Moving the cyclic aft produces a reduction decent rate and autorotation speed. Baseline autorotation not performed because the measurement of cyclic position extremely difficult.



<p>527.177 Static Directional Stability</p>	<p>Cruise:</p> <p>With the power set for a cruise at 60 KIAS. Apply L/H and R/H rudder input to approximately 10 deg sideslip. The helicopter directional stability must be positive steadily increasing directional control input for increasing angles of sideslip.</p> <table border="1" data-bbox="389 367 982 766"> <thead> <tr> <th>Speed</th><th>Speed (IAS)</th><th>Sideslip positive return</th></tr> </thead> <tbody> <tr> <td>60</td><td>60</td><td>Positive L/H /Neutral R/H</td></tr> <tr> <td>+10</td><td>70</td><td>Positive L/H /Neutral R/H</td></tr> <tr> <td>+10</td><td>80</td><td>Positive L/H /Neutral R/H</td></tr> <tr> <td>+10</td><td>90</td><td>Positive L/H /Positive R/H</td></tr> <tr> <td>+10</td><td>100</td><td>Positive L/H /Positive R/H</td></tr> <tr> <td>+10</td><td>100</td><td>Positive L/H /Positive R/H</td></tr> <tr> <td>+10</td><td>110</td><td>Positive L/H /Positive R/H</td></tr> </tbody> </table> <ul style="list-style-type: none"> <li>- Note any abnormal vibrations. No vibration</li> <li>- Note any abnormal degradation in directional stability. Below 90 knots on right pedal input the helicopter is fairly neutral on both configurations with and without BearPaw.</li> </ul>	Speed	Speed (IAS)	Sideslip positive return	60	60	Positive L/H /Neutral R/H	+10	70	Positive L/H /Neutral R/H	+10	80	Positive L/H /Neutral R/H	+10	90	Positive L/H /Positive R/H	+10	100	Positive L/H /Positive R/H	+10	100	Positive L/H /Positive R/H	+10	110	Positive L/H /Positive R/H	
Speed	Speed (IAS)	Sideslip positive return																								
60	60	Positive L/H /Neutral R/H																								
+10	70	Positive L/H /Neutral R/H																								
+10	80	Positive L/H /Neutral R/H																								
+10	90	Positive L/H /Positive R/H																								
+10	100	Positive L/H /Positive R/H																								
+10	100	Positive L/H /Positive R/H																								
+10	110	Positive L/H /Positive R/H																								
<p>527.629 Flutter</p> <p>527.143 Controllability and Maneuverability</p>	<p>Perform a shallow dive at 1.1 VNE. Note the following</p> <ul style="list-style-type: none"> <li>- Abnormal vibration of the airframe, landing gear and rotor blade</li> <li>- Abnormal vibration of BearPaw/Landing Gear</li> <li>- Large displacements of BearPaw</li> <li>- Controllability of the helicopter</li> </ul> <p>No <b>abnormal</b> vibration at 1.1 VNE between the two configurations but lots of wind inside the cabin through the door seals. The pilot was concerned about window cracking at high speed. This seems to have happen on previous helicopters at high speed during the cold weather. Did not stay at VNE for very long.</p>																									

With the above modification(s) installed the helicopter exhibited the flight characteristics and performance of a standard EC130 B4.

Pilot's Name: Olivier Moyat Pilot's License No: CH 175386

If applicable - DAR's Signature Mirko Zgela DAR's /No: #310



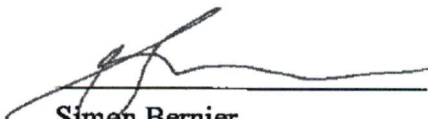
Aviatech Services Techniques Inc.  
3005, rue Lindbergh  
Trois-Rivières, Québec, G9A 5E1  
Tél: (819)601-8049 Fax: (819) 377-7928

## Aviatech Technical Services Inc.

### Structural Substantiation Helitowcart BearPaw Model EC130

**Report: ATS-1034-STR-1000 Rev NC**

PREPARED BY:

  
Simon Bernier  
Staff Specialist - Structure

DATE: DEC 21, 2010


APPROVED BY:

  
Mirko Zgela  
Design Approval Representative

DATE: MAY 04, 2011

DAR #310

This report and its technical content is the Confidential property of Aviatech Technical Services Inc. and is not to be disclosed to any third parties without the written permission of Aviatech Technical Services Inc.

 D. B. B. 2011 05 24  
as noted

### RECORDS OF REVISIONS

Revision	Revision Date	Revision of Entry	Entered by
NC	May 04,2011	Initial	M.Z

This report and its technical content is the Confidential property of Aviatech Technical Services Inc. and is not to be disclosed to any third parties without the written permission of Aviatech Technical Services Inc.

## TABLE OF CONTENTS

<b>TABLE OF CONTENTS .....</b>	<b>3</b>
<b>1.0 INTRODUCTION.....</b>	<b>5</b>
1.1 BACKGROUND.....	5
1.2 PURPOSE .....	5
1.3 MODIFICATION DESCRIPTION.....	5
1.4 APPLICABLE DRAWINGS .....	6
<b>2.0 STRUCTURAL LOADS .....</b>	<b>7</b>
2.1 GENERAL .....	7
2.2 GROUND LOADS.....	7
2.3 FACTORS.....	7
<b>3.0 DETAILED STRUCTURAL ANALYSIS.....</b>	<b>8</b>
3.1 GENERAL .....	8
<b>4.0 FINITE ELEMENT ANALYSIS .....</b>	<b>8</b>
4.1 FINITE ELEMENT MODEL DESCRIPTION .....	8
4.2 FINITE ELEMENT MODEL RESULT .....	9
<b>5.0 ATTACHMENTS ANALYSIS.....</b>	<b>11</b>
5.1 ATTACHMENT LOAD DESCRIPTION .....	11
5.2 FAILURE OF THE STAINLESS STEEL CLIP .....	11
5.3 FAILURE IN SHEAR OF THE ATTACHING BOLTS .....	13
5.4 FAILURE IN BEARING OF THE BEARPAW IN BOLTS HOLES .....	13
<b>6.0 CONCLUSIONS .....</b>	<b>15</b>
<b>7.0 REFERENCES.....</b>	<b>16</b>



### List of Tables

Table 1 - CAR 527 Airworthiness Requirements .....	5
Table 2 - Applicable Drawings .....	6
Table 3 - BearPaw Margin of Safety .....	10

### List of Figures

Figure 1 - BearPaw EC130 Assembly .....	6
Figure 2 - Finite element Model Representation .....	9
Figure 3 - Finite Element Model Mesh Representation .....	9
Figure 4 - Top BearPaw Von Mises Stress .....	9
Figure 5 - Bottom BearPaw Von Mises Stress .....	10
Figure 6 - Attachment Load Representation .....	11
Figure 7 - Stainless Steel Clip Representation .....	12

### List of Annexes

ANNEX A - UHMW TIVAR PROPERTY .....	17
-------------------------------------	----

## 1.0 INTRODUCTION

### 1.1 Background

Helitowcart is a company that design, manufacture and distribute ground handling devices for light to medium weight helicopters. Its mission is to design and to provide reliable and secure products, capable of multiple applications while incorporating superior aesthetics. In order to increase its product line basis, Helitowcart has recently developed a BearPaw design for the Robinson R44 helicopter and the model BP350 BearPaw is a similar design that can be installed on the AS350 and AS355 series helicopters. The BP130 is to enlarge the Eurocopter family product on the EC130 model. This design requires also airworthiness approval.

### 1.2 Purpose

This document provides the structural substantiation for the installation of the Helitowcart BearPaw Model EC130. More specifically this report will demonstrate compliance to the following CAR 527 airworthiness requirements, see Table 1:

CAR 527	Requirements
27.301	Loads
27.303	Factor of Safety
27.305	Strength & Deformation
27.307	Proof of structure
27.321	General
27.337	Maneuvering conditions
27.501	Ground Load Conditions – Landing Gear with Skids
27.603	Material Strength Properties

Table 1- CAR 527 Airworthiness Requirements

### 1.3 Modification Description

The Helitowcart BearPaw's are made of machined UHMW TIVAR® polymer 1.0 in. sheet material. This material combines high-impact performance, low friction and good resistance to chemical. Its high durability provides superior performance. The UHMW Polymer has a lower coefficient of friction than glass. Together with its self lubricating characteristics is an ideal material for this design application where sliding contact is encountered.

The machined BearPaw is attached to the R/H and L/H helicopter aft skid tubes where the aft cross tube attaches. The BearPaw is attached to the skids using three stainless steel bands

This report and its technical content is the Confidential property of Aviatech Technical Services Inc. and is not to be disclosed to any third parties without the written permission of Aviatech Technical Services Inc.

and six AN-4 bolts. <sup>in 3 positions.</sup> The BearPaw pad has a machined recess on its centerline that perfectly matches the cross tube contour providing a smooth skid bearing loads. The total weight of the installation is less than 21 lbs. A typical BearPaw Model BP130 assembly is shown in Figure 1.

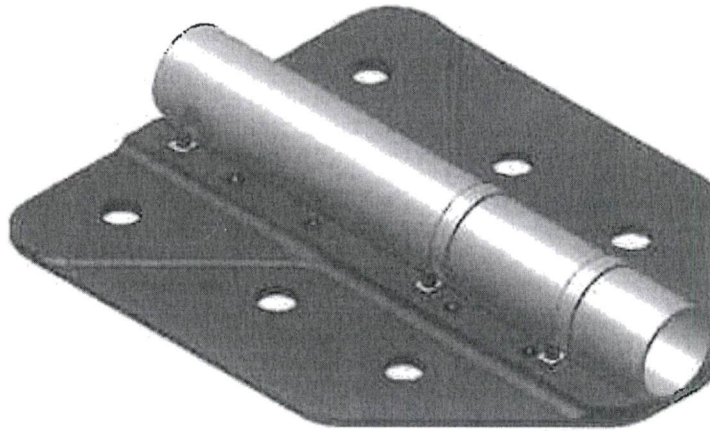


Figure 1 - BearPaw EC130 Assembly

#### 1.4 Applicable Drawings

The following drawings define the structural configuration of the BearPaw Model BP130 and have been used in the analysis.

Drawings #	Title	Revision Status	Date
VNR084	BearPaw – Iceblade	R01	Apr 24, 2006
VNR085	BearPaw – Iceblade Threaded Rod	R01	Apr 24, 2006
314-0005-15 (VNR086)	BearPaw – Iceblade Assembly	A (R01)	Apr 24, 2006
314-0007-15 (VNR089)	Bearpaw – Slotted Clip Support	B (R04)	July 31, 2006
314-0015-01	Filler Block <sup>1/2"</sup> <del>3/8"</del> <sub>2B</sub>	A	Aug 8, 2006
112-0005-00	BearPaw BP130 – Assembly	A	May 04, 2011
314-0024-01	BearPaw - BP130 Pad	A	May 04, 2011
314-0025-15	BP130 - L Shaped Clip	A	May 04, 2011
314-0026-15	BP130 - U Shaped Clip	A	May 04, 2011

Table 2 - Applicable Drawings

This report and its technical content is the Confidential property of Aviatech Technical Services Inc. and is not to be disclosed to any third parties without the written permission of Aviatech Technical Services Inc.



## 2.0 STRUCTURAL LOADS

### 2.1 General

The helicopter BearPaw will be subjected to both maneuvering and ground loading actions. The BearPaw has a very small cross-section and is of light weight construction, as such, the only significant loads will be generated by the ground loading actions of the helicopter resting on its skids. Consequently only the ground loads will be considered in the analysis.

### 2.2 Ground Loads

From reference [1], the ground load have been extracted. Load acting under the BearPaw ( $L_{BP}$ ) and the drag force ( $F_d$ )<sup>1</sup>

$$L_{BP} = 3307 \text{ lbs}$$

$$F_d = 562 \text{ lbs}$$

Since the EC130 is lighter using the same loading condition is conservative.

### 2.3 Factors

The following factors will be used in the detailed stress analysis if required:

- a) a factor of 1.5 to go from limit to ultimate load
- b) a factor of 1.15 to be used as fitting factor since the equipment will be subjected to significant vibrations; and
- c) no special factor is needed.

---

<sup>1</sup> The drag force is the friction load during the landing.



### 3.0 DETAILED STRUCTURAL ANALYSIS

#### 3.1 General

The following failures modes have been evaluated;

- Finite element study of BearPaw pad resulting from the combined loading  $F_d$  and  $L_{BP}$ ;
- Failure of the stainless steel clip due to the application of  $F_d$ ;
- Failure in shear of the stainless steel clip attaching bolts due to the application of  $F_d$ .
- Failure in bearing of the BearPaw in bolts holes due to the application of  $F_d$ .

### 4.0 FINITE ELEMENT ANALYSIS

#### 4.1 Finite Element Model Description

The BearPaw is studied by finite element software Ansys Workbench 11. The 6x AN4 bolt are represented by the "D" to "I" remote displacement <sup>which</sup> constrain the BearPaw in the  $\pm Y$  direction. The skid is represented with the "B" frictionless support and constrain the BearPaw in the  $+Z$  direction. The load applied under the BearPaw is "A" <sup>which</sup> with represent the landing load ( $L_{BP}$ ). Finally, the load "C" represent the friction load during the landing ( $F_d$ ). See Figure 2 for the finite element model in Ansys Workbench 12.

Static Structural

Time: 1. s

2010/12/21 15:08

■ LBP Load: 3307. lbf

■ Frictionless Support (Skid)

■ FD Load: 562. lbf

D Remote Displacement

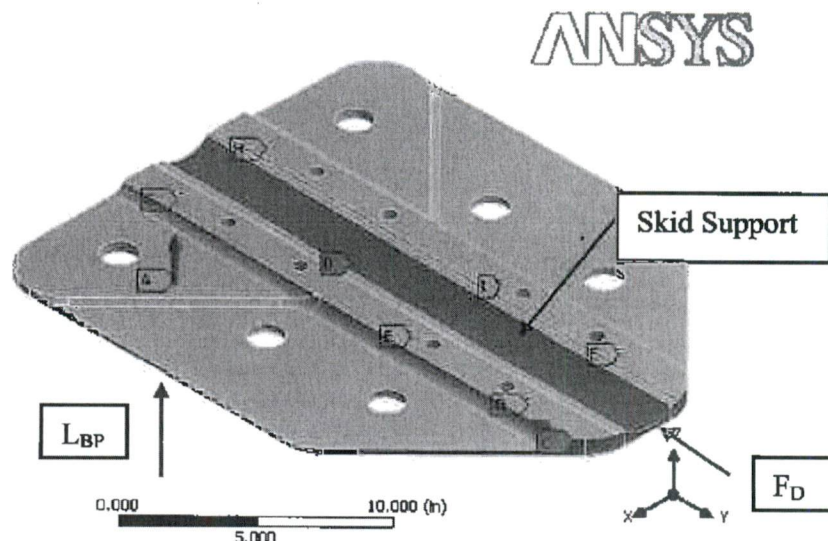
E Remote Displacement 2

F Remote Displacement 3

G Remote Displacement 5

H Remote Displacement 6

I Remote Displacement 4

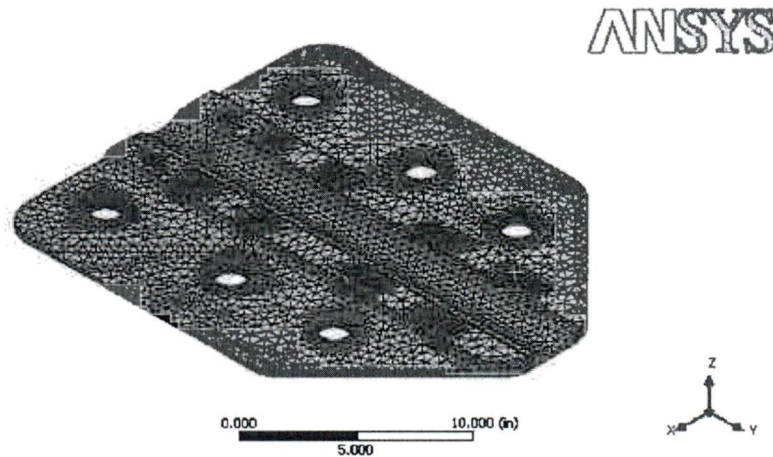


This report and its technical content is the Confidential property of Aviatech Technical Services Inc. and is not to be disclosed to any third parties without the written permission of Aviatech Technical Services Inc.

AP

**Figure 2 - Finite element Model Representation**

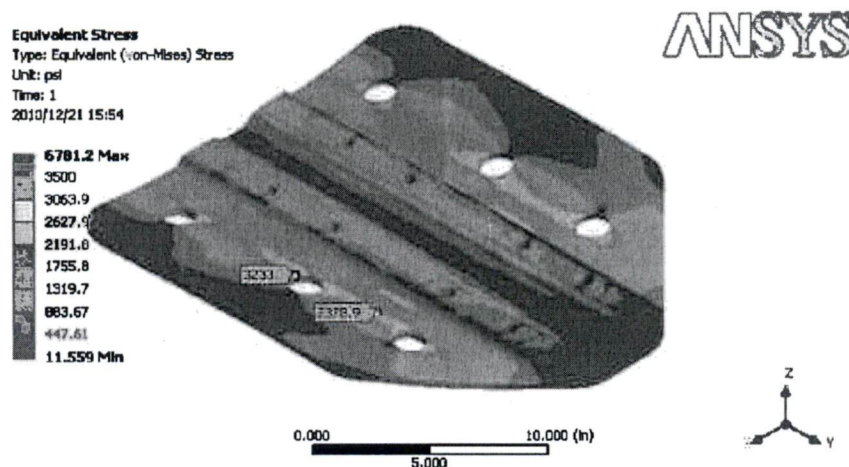
The mesh is composed of the tetrahedral elements SOLID187. <sup>which</sup> is well suited to modeling irregular meshes. All holes of the model have been refined. The mesh is composed of 163 669 nodes and 101 394 elements. See Figure 3 for the finite element model mesh representation.



**Figure 3 - Finite Element Model Mesh Representation**

## 4.2 Finite Element Model Result

The Figure 4 and Figure 5 show the Von Mises stress result.



**Figure 4 - Top BearPaw Von Mises Stress**

This report and its technical content is the Confidential property of Aviatech Technical Services Inc. and is not to be disclosed to any third parties without the written permission of Aviatech Technical Services Inc.

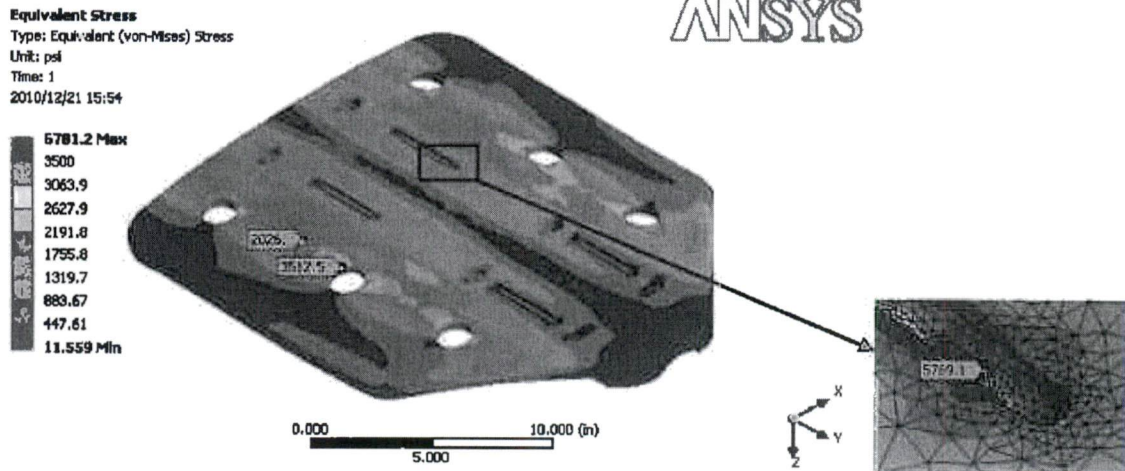


Figure 5 - Bottom BearPaw Von Mises Stress

The maximum Von Mises stress is 3513 psi. There is a peak of stress in the ice blade pocket, but it is not considerable because it is on a sharp edge and the material is elastic.

As stated earlier the BearPaw is made of UHMW and Table 3 shows the margin of safety calculated as :

$$M.S. = \frac{\text{Material Strength}}{(\text{Calculated Stress} * F.S)} - 1$$

Material UHMW Ultimate Tensile Strength (psi)	Von Mises Stress (psi)	Factor of Safety	Margin of Safety
6800	3513	1.5	0.29

Table 3 - BearPaw Margin of Safety



## 5.0 ATTACHMENTS ANALYSIS

### 5.1 Attachment Load Description

The drag load on the BearPaw is redistributed equally on the three attachment clip. The loading distribution is as shown in Figure 1. All calculation was made in Excel from reference [2] and was copied here.

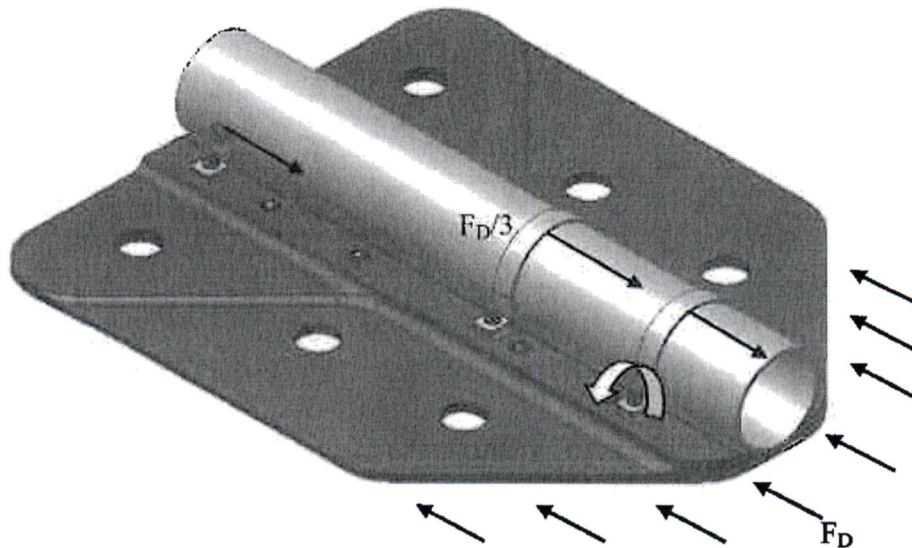


Figure 6 - Attachment Load Representation

### 5.2 Failure of the Stainless Steel Clip

Figure 7 shows the front view of the BearPaw installation. The  $L_m$  distance goes to the BearPaw surface instead of the filler block, in case, in the future, the clip would be designed in full length. The Clip is made of stainless steel 304 have a shear stress of 50 Ksi (Ref. [4]).

This report and its technical content is the Confidential property of Aviatech Technical Services Inc. and is not to be disclosed to any third parties without the written permission of Aviatech Technical Services Inc.



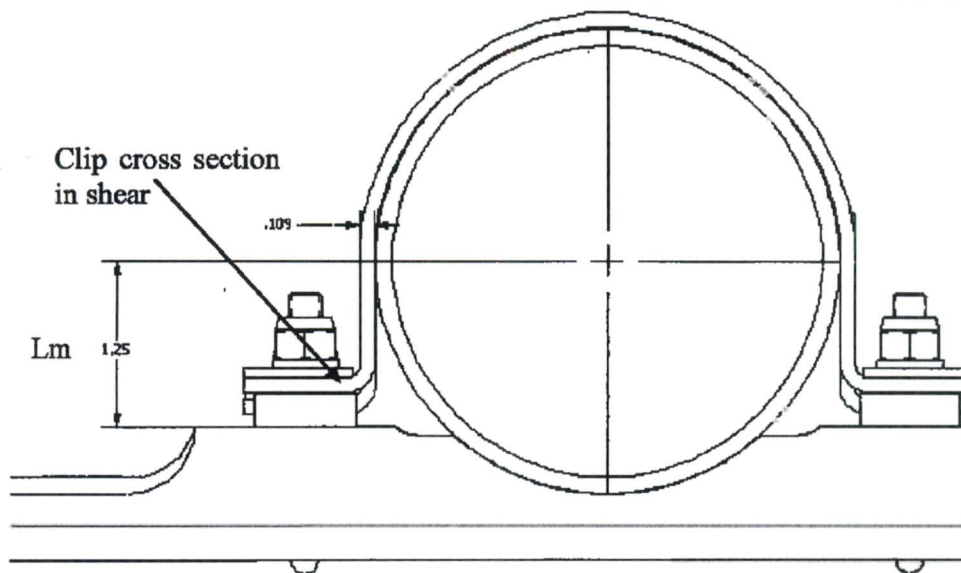


Figure 7 - Stainless Steel Clip Representation

Assuming that the local moment will be distributed equally between the 12x attachment bolts (two BearPaws), the local moment will be given by:

$$F_D \text{ (lbs)} = 562$$

$L_m$  = Distance between the mid section of the skid tube to the top of the Bear Paw

$$L_m \text{ (in)} = 1.25$$

$M_D$  = The local moment of the clip due of the drag

$$M_D = (F_D * L_m) / 12$$

$$M_D \text{ (in*lbs)} = 58.54$$

This local moment will be reacted by shear stresses resulting from the applied torsion in the clip cross section. The shear stresses  $F_{MD}$  will be given by:

$t_c$  = thickness of the clip

$$t_c \text{ (in)} = 0.109$$

$b_c$  = width of the clip

$$b_c \text{ (in)} = 0.75$$

$F_{MD}$  = Stress of the clip caused by the moment of the drag

$$F_{MD} = (3 * M) / (b * t^2)$$

$$F_{MD} \text{ (psi)} = 19709$$

This report and its technical content is the Confidential property of Aviatech Technical Services Inc. and is not to be disclosed to any third parties without the written permission of Aviatech Technical Services Inc.

$F_{SU}$  (psi) = Clip material ultimate shear stress

$F_{SU}$  (psi) = 50000

F.S = 1.50

M.S. =  $(F_{SU} / (F_{MD} * F.S)) - 1$

M.S. = 0.69

Even negative this result is conservative, because the friction between the BearPaw and the skid was not considered.

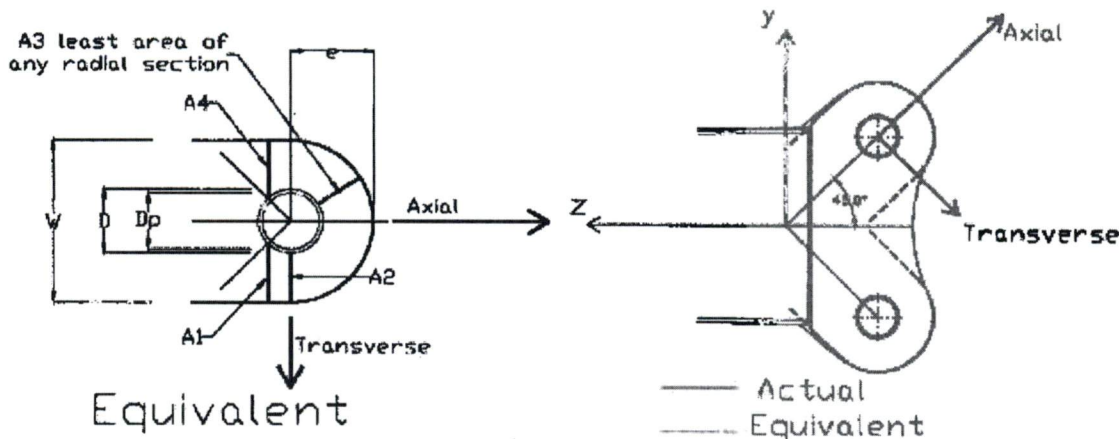
### 5.3 Failure in Shear of the Attaching Bolts

The AN4 bolts take 3600 lbs in shear<sup>2</sup> and  $F_D$  is 562 lbs <sup>which</sup> ~~which~~ is minimalist.

### 5.4 Failure in Bearing of the BearPaw in Bolts Holes

The bearing of the BearPaw is calculated as per Brhun (ref [3]);

**Material :** UHMW  
 $F_{tu}$  6 800 Psi  
 $F_{su}$  3 500 Psi  
 $F_{ty}$  3 400 Psi



<sup>2</sup> Reference [3] Table D1.1

This report and its technical content is the Confidential property of Aviatech Technical Services Inc. and is not to be disclosed to any third parties without the written permission of Aviatech Technical Services Inc.

### Lug Dimention Defenition

t (in) = 0.670  
D (in) = 0.250  
e (in) = 2.000  
W (in) = 2.000  
Fa (lbs) = 586.00 Axial Load  
Ft (lbs) = 0.00 Transverse Load  
F.S. = 1.73 Factor of Safety

Abr (in<sup>2</sup>) = 0.1675 Abr = D\*t

D/t = 0.37

e/D = 8

t/D = 2.68

Kbry 2.8 Fig D1.14

Pbry (lbf) = 1 595 Pbry = Kbry\*Abr\*Fty

Shear-Bearing yeild

MSbry 0.58 MSbry = Pbry / (Fa\*FS)-1

## 6.0 CONCLUSIONS

The modification of the BearPaw EC130 and BearPaw EC130 assembly is structurally acceptable.



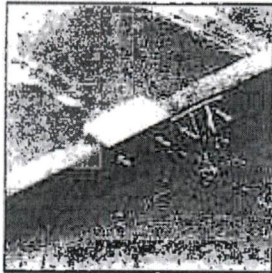
## 7.0 REFERENCES

- [1] STR-BP-AS350/355-1000 Rev NC "Structural Substantiation - Helitowcart BearPaw Model BP350" dated November 26, 2006
- [2] ATS-1034-XLS-1000 Rev NC " BearPaw EC130 Calculation" dated December 21, 2010
- [3] Bruhn, "Analysis and Design of Flight Vehicle Structures", Second Edition, June 1973.
- [4] MIL-HDBK-5H, "Metallic Material and Elements for Aerospace Vehicle Structures" December 1998

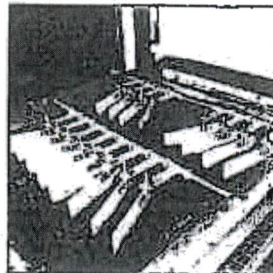
## **ANNEX A - UHMW TIVAR PROPERTY**

This report and its technical content is the Confidential property of Aviatech Technical Services Inc. and is not to be disclosed to any third parties without the written permission of Aviatech Technical Services Inc.

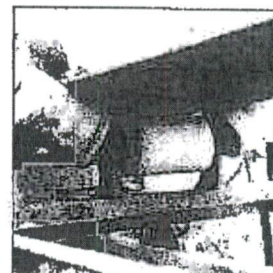
Propriétés du UHMW TVAR®



TVAR® peut être utilisé en tant que support  
pour les pièces en métal, bois, etc.  
sans nécessiter de traitement spécial.



TVAR® est utilisé en tant que support  
pour les pièces en métal, bois, etc.  
sans nécessiter de traitement spécial.



Convoies, rollers, bandes avec TVAR®  
réduisent les coûts. Les débris ne s'accumulent  
pas sur les convoyeurs.

PROPERTY	TEST METHOD	UNIT	TYPICAL VALUE
Specific Gravity	ASTM D-792	g/cm³	0.94
Yield Strength	ASTM D-638	psi	3400
Ultimate Tensile Strength	ASTM D-638	psi	6000
Break Elongation	ASTM D-638	%	400
Yield Strength	Stress Strain Diagram	psi	700
Ultimate Tensile Strength	Stress Strain Diagram	psi	3000
Break Elongation	Stress Strain Diagram	%	300
Hardness - Rockwell "R" Scale	ASTM D-798	—	64
Hardness - Shore "D" Scale	ASTM D-3360	—	67
Flexural Modulus of Elasticity	ASTM D-790	psi	110,000
Impact Strength	ASTM D-256	ft-lb/in	3500
Impact Strength - Charpy	ASTM D-256	J/m²	No Break
Environmental Stress Cracking @ 70°F	ASTM D-1699 Mod	hrs	6000
Water Absorption	ASTM D-570	%	Nil

UHMW Polymer has a lower coefficient of friction than steel. Together with its self-lubricating characteristics it is an ideal material for bearings, bushings, valves, wear strips or any application where sliding contact is encountered.

MATERIALS	STATIC	KINETIC	TEST METHOD
Mild Steel vs. Mild Steel	0.20-0.30	0.15-0.25	ASTM D-1884
Mild Steel vs. TVAR-100	0.10-0.20	0.05-0.10	

TEMP °F	COMPRESSION	DEFORMATION UNDER COMPRESSION - %				PERMANENT DEFORMATION AFTER REMOVAL OF LOAD	
		10 MIN.	100 MIN.	1000 MIN.	1 DAY	AFTER 1 MIN.	AFTER 24 HRS.
50°	250	1.9	1.7	1.3	1.3	0.8	0.8
	500	5.4	3.5	2.7	3.0	1.5	1.3
	1000	9.2	4.5	4.8	5.0	2.7	1.9
	1500	14.0	6.0	6.0	7.0	3.8	2.5
	2000	16.0	6.5	7.5	8.0	4.5	3.0

CHEMICAL RESISTANCE

Hydrochloric acid (conc.) - no appreciable reaction up to 80°C.  
Nitric acid (20%) - less than 20% decrease in yield stress and ultimate tensile strength up to 80°C.  
Sulfuric acid (50%) - no appreciable reaction up to 80°C. Less than 20% decrease in properties at 75% concentration.  
Sodium hydroxide (caustic soda) - no appreciable reaction up to 80°C.  
Sodium hypochlorite and most aqueous solutions of inorganic salts - no appreciable reaction up to 80°C.  
Hydrocarbons and halogenated hydrocarbons - limited resistance. Each application should be evaluated.

www.plastiquepolyfab.com

QUÉBEC : 1275, de la Jonquière, Québec, QC, : Tél : 418-682-0760 ou 1-866-682-0760  
MONTREAL : 7600, Rue Transcanadienne, St-Laurent, QC, H4T 1A5 Tél : 514-738-6817 ou 1-888-506-9600

Helitowcart 314-0008-01-A  
2008-05-23  
1 of 1

This report and its technical content is the Confidential property of Aviatech Technical Services Inc. and is not to be disclosed to any third parties without the written permission of Aviatech Technical Services Inc.

**TABLE OF CONTENTS:**

<b>INTRODUCTION</b>	<b>2</b>
Scope	2
General	2
Helicopter Effectivity	2
Installer Responsibilities	2
<b>INSTALLATION</b>	<b>2</b>
BearPaw Installation	2
BearPaw Removal	5
Weight & Balance	5
Parts Lists	5
<b>INSPECTION</b>	<b>6</b>
Life Limited Items	6
Pre-Flight	6
Periodic Inspection Schedule	6
500 Hour or Yearly Inspection Details	6
Overhaul Requirements	7
<b>REVISIONS &amp; APPROVAL</b>	<b>7</b>
Revisions	7
Approval	7
Annex A	8
Annex B	10

2011 05 27  
*[Signature]*  
as noted.



## INTRODUCTION

### Scope

This installation instruction describes the step-by-step approach to install and to perform maintenance of the Helitowcart BearPaw Model BP 130 (P/N 112-0005-00) for the EC130-B4 helicopters.

### General

The Helitowcart BearPaw is made of machined UHMW TIVAR® polymer sheet. This material combines high-impact performance, low friction and good resistance to chemical. Its high durability will provide superior performance when installed on your helicopter. Any question regarding the Helitowcart BearPaw system shall be directed to Helitowcart Customer Support as indicated in Table (1):

**Table 1 – Helitowcart Customer Support**

Care of	Mailing Address	Phone, Fax & Email:
Customer Support Helitowcart BearPaw Helitowcart (Vanair inc)	877A Alphonse-Desrochers St-Nicholas, Levis, Quebec, Canada, G7A 3K6	Tel:1 (418) 561-4512 Fax:1 (418) 836-4575 <a href="mailto:info@helitowcart.com">info@helitowcart.com</a>

### Helicopter Effectivity

This installation instruction applies to the following helicopter models:

**Table 2 – Helicopter Model Effectivity**

Make	Model	Transport Canada Type Certificate Data Sheet
Eurocopter	EC 130 B4	H-83

### Installer Responsibilities

The installer shall ensure that the installation of the Helitowcart BearPaw does not conflict with any other part of the helicopter configuration. Technicians performing this installation should be familiar with A/C work and should have been familiarized with the different Helitowcart BearPaw system components prior to performing a first time installation. All steps in this procedure must be followed. Deviations from the procedures may result in potential structural failure or equipment malfunction and will result in a non-compliant installation.

## INSTALLATION

### BearPaw Installation

#### Reference Documentation:

[1] Helicopter Maintenance Manual EC130 as applicable.

#### Step 1: Helicopter Preparation

- Ensure the helicopter is safe for maintenance;
- Lift the helicopter using the manufacturer recommended practice provided in Ref [1] as applicable to your helicopter model to allow a ground clearance of the skid in the area of the aft cross tube of approximately 1 ½" (38mm);
- Remove Aft AN5 bolt;

**Note:** The BearPaw Model BP130 (P/N 112-0005-00) can be installed with or without the skid tube wear shoes.

#### Step 2: IceBlade Installation

**Note:** The BearPaw Model BP130 (P/N 112-0005-00) can be installed with or without the IceBlades

- With IceBlade Option
- Install ice blades (Qty: 4) (Iceblades P/N 314-0005-15) under BearPaw pad as per drawing (112-0005-00) provided at Annex A.
- Secure ice blades with washer (Washer P/N 263-0001-17) and nut (P/N 262-0001-17).

#### Step 3: BearPaw Installation

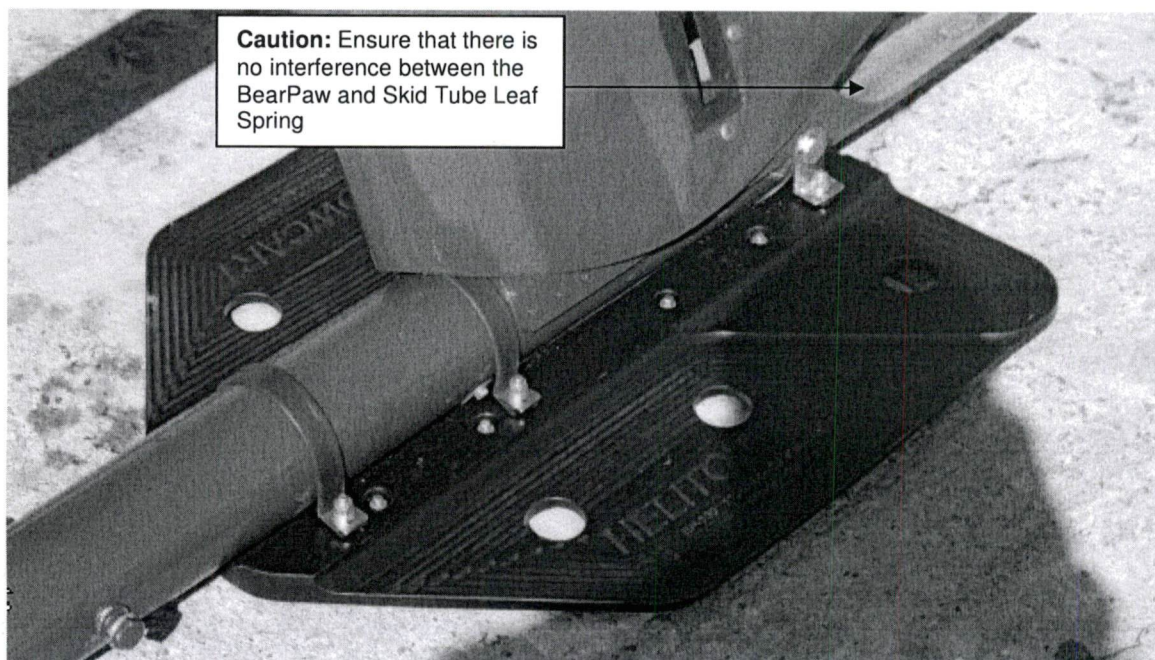
- Position the BearPaw under the skid as shown in Figure 1 with narrow edge pointing forward.
- Insert washers (P/N 263-0001-17) through all six bolts: 6x(261-0001-17);
- Insert bolts (P/N 261-0001-17) and washer (Washer P/N 263-0001-17) through BearPaw pad as per drawing (112-0005-00) provided at Annex A;
- Insert filler blocks (P/N314-0015-01) in the six bolts as per drawing (112-0002-00) provided at Annex A;

**Note:** The use of filler blocks (P/N314-0015-01) may be replaced or complemented by the use of washers (P/N 263-0001-17) to fill in the gap. Bolts (P/N 261-0001-17) may be replaced by longer or shorter AN4 bolts as required.

- Insert both U-shaped clips (P/N 314-0026-15) through forward bolts: 4x(261-0001-17);
- Insert both L-shaped clips (P/N 314-0025-15) through aftward bolts: 2x(261-0001-17);
- Insert slotted clip supports (P/N 314-0007-15) through all six bolts. Position slotted clip supports with rounded edge toward helicopter skid;
- Insert washer (P/N 263-0001-17) & screw nuts (P/N 262-0001-17) for a tight fit. Max. torque on nuts 60 in.-lb;
- Re-install removed AN-5 Bolt from step one;
- Remove helicopter from lift;
- Amend Weight & Balance records as required using data provided in Table 3.



Figure 1 – BearPaw Model BP130 (P/N 112-0005-00) - Alignment on Skid



### BearPaw Removal

#### Step 1: Helicopter Preparation

- Ensure the helicopter is safe for maintenance;
- Lift the helicopter using the manufacturer recommended practice provided in Ref [1] to allow a clearance of the skid in the area of the aft cross tube of approximately 1 ½" (38mm);

#### Step 2: BearPaw Removal

- Remove aftward AN5 bolt;
- Remove nuts (P/N 262-0001-17), slotted clip support (P/N 314-0007-15) on U-shaped clips (P/N 314-0026-15)2x and L-shaped clips (P/N 314-0025-15);
- Remove washers (P/N 263-0001-17), U-shaped clips (P/N 314-0019-15), L-shaped clips (P/N 314-0025-15), filler blocks (P/N314-0015-01) and remove BearPaw pad (P/N 314-0024-01);
- Inspect skid tubes to confirm serviceability;
- Re-install aftward AN5 bolt;
- If the skid tube shoes have been removed, re-install shoes as per reference [1];
- Complete installation by putting helicopter back to normal position by removing lift status;
- Amend Weight & Balance records as required using data provided in Table 3.

### Weight & Balance

The following information should be used to amend the helicopter weight and balance information following the installation or removal:

**Table 3 – Weight & Balance Data**

Item	Weight	Lateral		Longitudinal	
		Arm	Moment	Arm	Moment
Helitowcart BearPaw Model BP130 (P/N 112-0005-00)	20.0 Lb 9.1 Kg	N/A	N/A	182.2 in. 462.9 cm	3644.0 in-lb 42.12 m-kG

Note: Weight and moment provided are for full kit installation.

### Parts Lists

The Helitowcart BearPaw detailed parts list is as follow:

**Table 4 – Parts List**

Description	Qty	Part No.	Drawing no./name
BearPaw Model BP130	1	112-0005-00	BearPaw BP130 Assembly
BearPaw Pad	1	314-0024-01	BearPaw BP130 – Pad
U Shaped Clips	2	314-0026-15	BearPaw BP130 - U Shaped Clips
L Shaped Clips	2	314-0025-15	BearPaw BP130 - L Shaped Clips
Slotted Clip Support	6	314-0007-15	BearPaw - Slotted Clip Support
Filler blocks <span style="border: 1px solid blue; border-radius: 50%; padding: 2px;">3/32"</span>	6	314-0015-01	BearPaw – Filler block 1/8"
Bolts	6	261-0001-17	Bolt- AN4-14
Nuts	6	262-0001-17	Nut- MS20365-428



Washers	12	263-0001-17	Washer – AN960-416
Shrink	3	314-0021-01	BearPaw – Shrink Specifications & Install.(1"x6.25")
<b>IceBlade Option Model OIB</b>	<b>4</b>	<b>314-0005-15</b>	<b>VNR086 / IceBlade Assembly</b>
Nuts	8	262-0001-17	Nut- MS20365-428
Washers	8	263-0001-17	Washer – AN960-416

## INSPECTION

### Life Limited Items

Three are no life limited items for the Helitowcart BearPaw.

### Pre-Flight

Before each flight the following items should be inspected:

- Check that attachment bolts are installed and secured,
- Check that BearPaws are free from visible damage,
- If damage is found, verify allowable damage according to:  
 Table 5 – Tolerances for cracks & wear and  
 Annex B – BearPaw BP130 Allowable Damage Drawing

### Periodic Inspection Schedule

- The Helitowcart BearPaw shall be inspected every 500 flying hours or yearly whichever comes first.
- The Helitowcart BearPaw can be inspected concurrently with the helicopter landing gear inspection.
- Recommended tolerance for performance of inspection is +/- 10% of the 500 hours period.
- Following an inspection, subsequent interval shall be adjusted to meet the original schedule from time of inspection. If inspection is performed earlier than the 10% tolerance, then following inspections shall be scheduled not to exceed the above mentioned tolerance.

### 500 Hour or Yearly Inspection Details

- Remove Helitowcart BearPaw: See Section "BearPaw Removal",
- Inspect all parts for damage & wear. See table & figure below for allowable damage,
- Replace all damaged parts,
- Replace parts worn beyond the tolerances indicated below.
- See Tolerances for cracks & wear:  
 Table 5 – Tolerances for cracks & wear, &  
 Annex B – BearPaw BP130 Allowable Damage Drawing

**Table 5 – Tolerances for Cracks & Wear**

Zone	Nominal Dimension (Inches)	Allowable Damage/Wear (Inches)	Cracks
A	0,50	0,050	
B	1,000	0,250	
C	0,625	0,075	<u>Stiffeners</u> : NO cracks allow in the radius.
D	0,50	0,050	



314-0031-00-A  
BearPaw Model BP130  
Installation Instructions – EC130

E	0,05 (FWD) 0.625 (AFT)	0,050 0,075	Holes: NO cracks around the holes.
---	---------------------------	----------------	------------------------------------

**Overhaul Requirements**

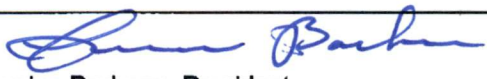
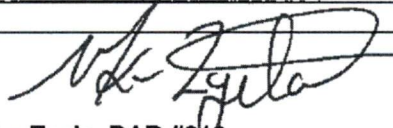
- Not applicable for the designated application of this device.

**REVISIONS & APPROVAL**

**Revisions**

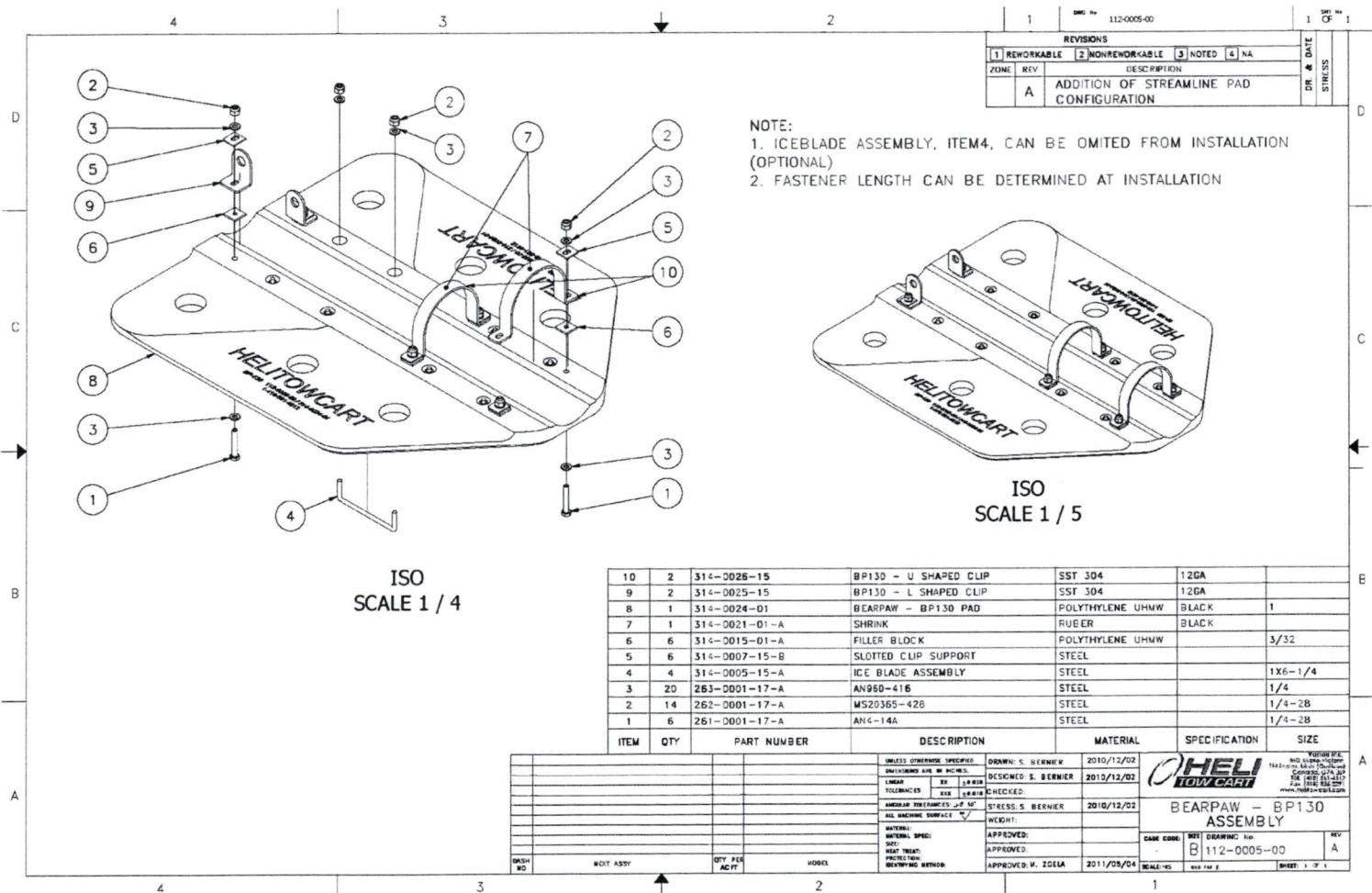
Date	Rev	Nature of Revisions
May 04, 2006 <i>2011</i>	A	Initial issue

**Approval**

Internal Approval :		
Helitowcart inc.	 Lucien Barbeau, President	Date: <i>2011</i> <i>05-06</i>
External Approval :		
Transport Canada	 Mirko Zgela, DAR #310	Date: <i>May 4, 2011</i>

**Annex A**

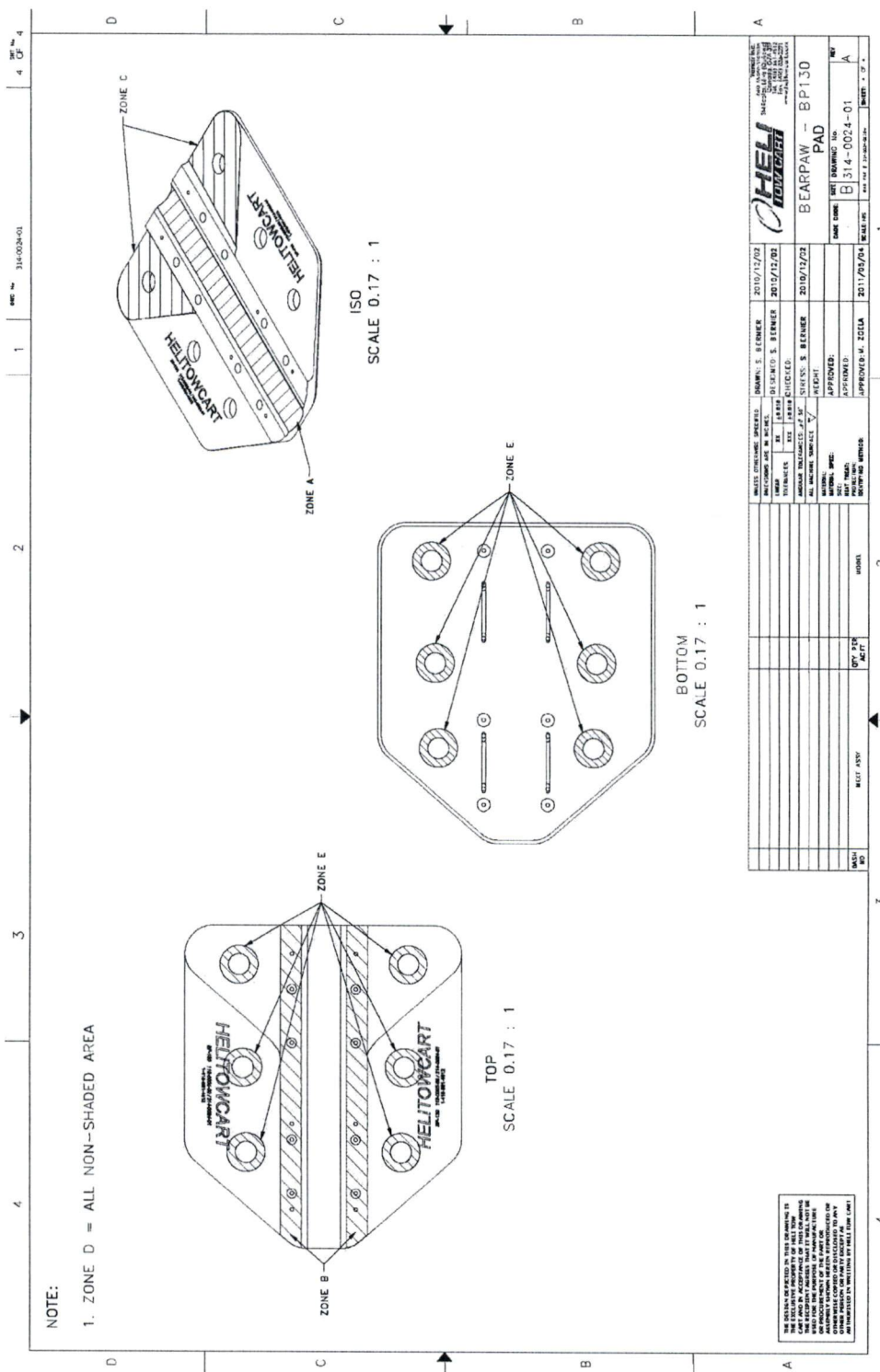
BearPaw Assembly, Drawing no. (112-0005-00)





**Annex B**

BearPaw Pad, Drawing no. 314-0024-01 Page 4 of 4.

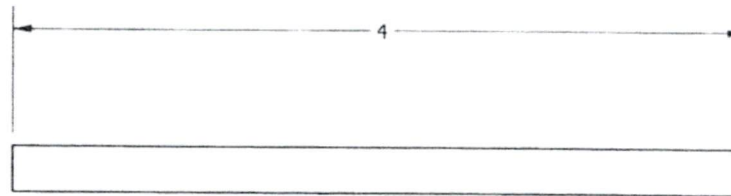


NOTES:

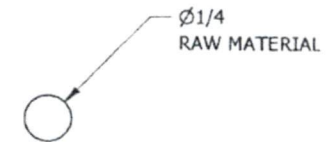
1. INTERPRET DRAWING IN ACCORDANCE WITH ASME Y14.5M 1994, DIMENSIONS AND TOLERANCING.

2. REMOVE ALL BURRS AND SHARP EDGES 0.020" MAX

ITEM	QTY	PART NUM	DESCRIPTION	MATERIAL	SPECIFICATION	SIZE
1	1	314-0002-15	BEARPAW - ICE BLADE ASSEMBLY	SS304	ANNEALED	ROD 1/4" DIA.



FRONT  
SCALE 1 : 1



RIGHT  
SCALE 1 : 1

THIS DRAWING IS PROPERTY OF <b>HELITOWCART</b> AND MAY NOT BE COPIED OR DISTRIBUTED WITHOUT AUTHORIZATION.		<b>Helitowcart</b> (Vanair inc.) St-Nicolas, Levis, Qc, Canada www.helitowcart.com		
DRAFTED BY: G. LAPOINTE	DATE: 2006-04-24	DEFINITION:  BEARPAW ICEBLADE		
CHECKED BY:	DATE:			
APPROVED TCCA BY: M. ZGELA	DATE: 2006-04-24			
IF NOT SPECIFIED GENERAL TOLERANCE		UNITS: INCH SIZE A SCALE: N/A	DRAWING NUMBER:  314-0002-15	REV B
1/X ± 1/32 X/XX ± 0.010" X/XXX ± 0.005" ANG. ± 1°		SHEET: 1 OF 1		

REVISION				
REV	DESCRIPTION	REVISED BY	APPROVED	DATE
A	INITIAL ISSUE	G.LAPOINTE	M. ZGELA	2006-04-24
B	REMOVED REVISION LETTER FROM P/N	R.B.R.	M. ZGELA	2013-08-09

314-0002-15 rev B

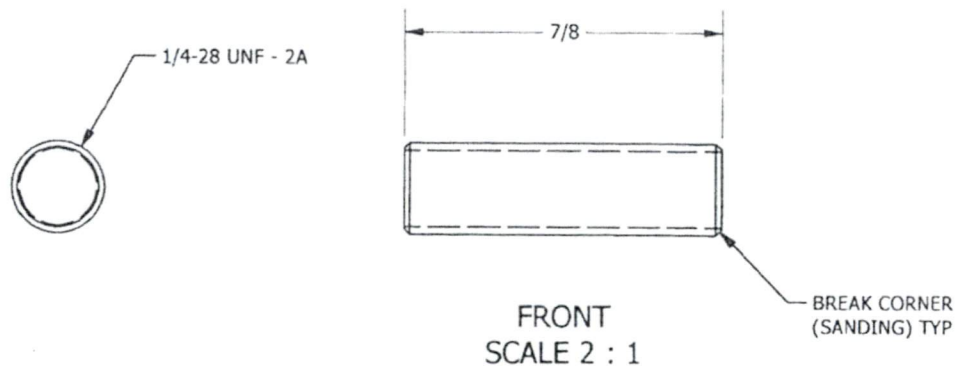
*Bailan* 20170602

## NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH ASME Y14.5M 1994,  
DIMENSIONS AND TOLERANCING

2. REMOVE ALL BURRS AND SHARP EDGES 1/64" MAX. ENSURE EDGES ARE  
SMOOTH.

ITEM	QTY	PART NUM	DESCRIPTION	MATERIAL	SPECIFICATION	SIZE
1	1	314-0004-15	BEARPAW - ICEBLADE THREADED ROD	SS304	ANNEALED	1/4-28 UNF - 2A



THIS DRAWING IS PROPERTY OF  
**HELITOWCART** AND MAY NOT BE COPIED OR  
DISTRIBUTED WITHOUT AUTHORIZATION.

DRAFTED BY:  
G. LAPOINTE

DATE:  
2006-04-24

CHECKED BY:

DATE:

APPROVED TCCA BY:  
M. ZGELA

DATE:  
2006-04-24

IF NOT SPECIFIED  
GENERAL TOLERANCE

UNITS:  
INCH

SIZE  
A

SCALE:  
N/A

1/X ± 1/32  
X/XX ± 0.010"  
X/XXX ± 0.005"  
ANG. ± 1°

**Helitowcart** (Vanair inc.)  
St-Nicolas, Levis, Qc, Canada  
www.helitowcart.com

DEFINITION:

BEARPAW  
ICEBLADE THREADED ROD

DRAWING NUMBER:

314-0004-15

REV

B

SHEET:

1 OF 1

REVISION				
REV	DESCRIPTION	REVISED BY	APPROVED	DATE
A	INITIAL ISSUE	G.LAPOINTE	M. ZGELA	2006-04-24
B	REMOVED REVISION LETTER FROM P/N	R.B.R.	M. ZGELA	2013-08-09

314-0004-15 rev B

P. Barthelemy 2017.06.02



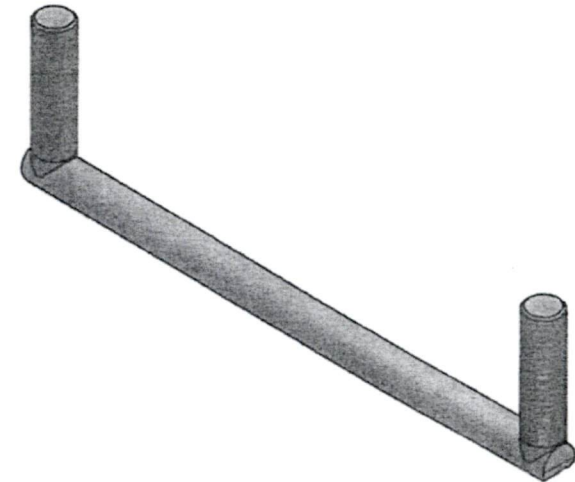
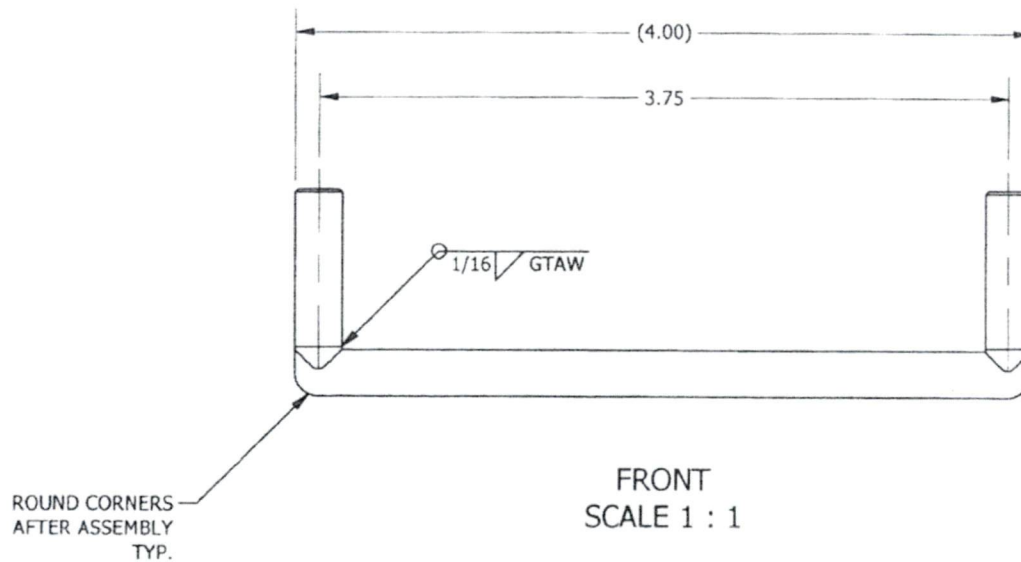
## NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH ASME Y14.5M 1994, DIMENSIONS AND TOLERANCING.

2. REMOVE ALL BURRS AND SHARP EDGES 1/64" MAX.

3. FILLER MATERIAL AWS A-5.9 / ASME SFA-5.9 MGSS308L

ITEM	QTY	PART NUM	DESCRIPTION	MATERIAL	SPECIFICATION	SIZE
1	1	314-0002-15	BEARPAW - ICE BLADE ASSEMBLY	SS304	ANNEALED	ROD 1/4" DIA.
2	2	314-0004-15	BEARPAW - ICEBLADE THREADED ROD	SS304	ANNEALED	1/4-28 UNF - 2A



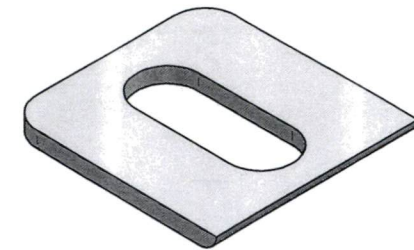
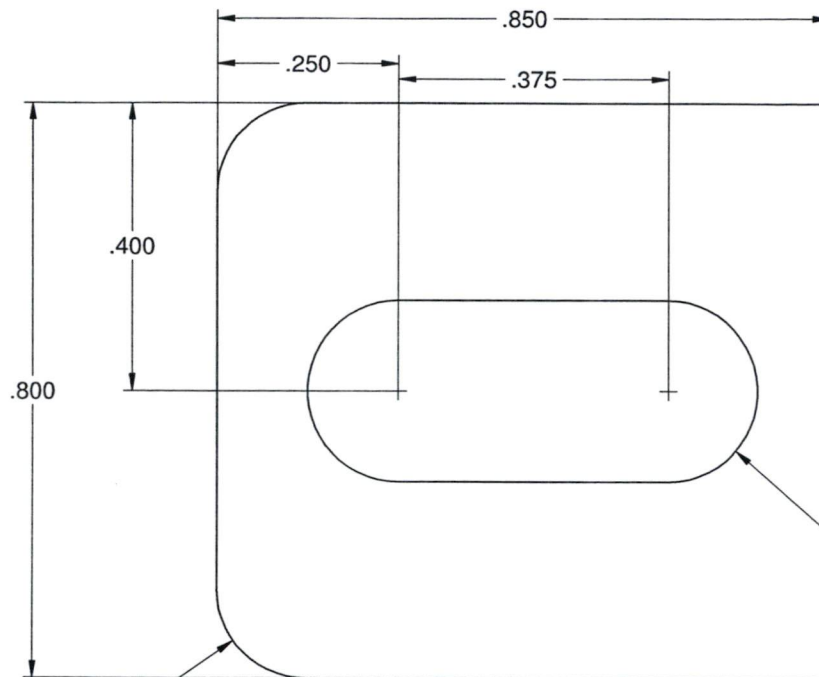
NOTE AU FOURNISSEUR:  
ÉBAVURER TOUT LE TOUR R1/64"  
PASSER DANS L'ACIDE  
REMPLIR FICHE D'INSPECTION CLIENT

REVISION				
REV	DESCRIPTION	REVISED BY	APPROVED	DATE
A	INITIAL ISSUE	G. LAPOINTE	M. ZGELA	2006-04-24
B	REMOVED REVISION LETTER FROM P/N	R.B.R.	M. ZGELA	2013-08-09

THIS DRAWING IS PROPERTY OF <b>HELITOWCART</b> AND MAY NOT BE COPIED OR DISTRIBUTED WITHOUT AUTHORIZATION.		<b>Helitowcart</b> (Vanair inc.) St-Nicolas, Levis, Qc, Canada www.helitowcart.com	
DRAFTED BY: G. LAPOINTE	DATE: 2006-04-24	DEFINITION:  BEARPAW ICEBLADE ASSEMBLY	
CHECKED BY:	DATE:		
APPROVED TCCA BY: M. ZGELA	DATE: 2006-04-24	DRAWING NUMBER: <b>314-0005-15</b>	REV <b>B</b>
IF NOT SPECIFIED GENERAL TOLERANCE		UNITS: INCH SIZE <b>A</b> SCALE: N/A	SHEET: 1 OF 1
1/XX ± 1/32 X.XX ± 0.010" X.XXX ± 0.005" ANG. ± 1°			

*N. Barla 2017.06.02*

314-0005-15 Rev B



R 1/8 in  
Typ.

1/16 in  
(gege 16)

Ø .250  $\begin{smallmatrix} +0.015 \\ -0.000 \end{smallmatrix}$

R 1/16 in  
Round edge  
Sanding

Note :  
Raw material specification :  
Stainless steel 304 annealed  
Sheet gage 16

Rev.	Description	Date	By
R04	0.800 was 0.750 - 0.850 was 0.875	31-07-06	G.L.
R03	Issue for production	04-04-06	G.L.

TOLERANCES
1/X $\pm$ 1/32"
X.XX $\pm$ 0.010"
X.XXX $\pm$
ANGLE $\pm$ 1°
PROJECTION:

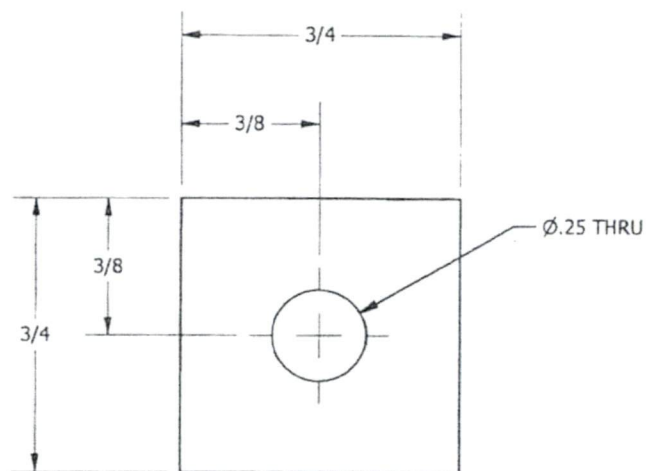
		<b>Vanair inc.</b> 860, Marie-Victorin St-Nicolas, Lévis (Québec) Canada, G7A 3S9 Tél. : (418) 561-4512 Fax : (418) 836-2291 <a href="http://www.helitowcart.com">www.helitowcart.com</a>		THIS DOCUMENT IS PROPERTY OF VANAIR INC. WRITTEN PERMISSION FROM VANAIR INC. SHALL BE OBTAINED PRIOR TO COPYING, USING OR MODIFYING.	
		Titre / Title: <b>Bearpaw - Slotted clip support</b>			
Dessiné par / Drawing by: <b>G. Lapointe</b>		Date: (yyyy-mm-dd) <b>2006-04-24</b>		Format: <b>A</b>	
Vérifié par / Checked by:		Date: (yyyy-mm-dd)		Échelle / Scale: <b>4 : 1</b>	
Approuvé par / Approved by: <i>N. Salas</i>		Date: (yyyy-mm-dd) <b>2011-05-27</b>		Page #: <b>1 de 1</b>	
PROJECTION:		Numéro dessin / Drawing Number: <b>VNR089</b>		Rev.#: <b>R04</b>	
		Numéro de pièce / Part Number: <b>314-0007-15-B</b>		Rev.#: <b>B</b>	

314-0007-15-B

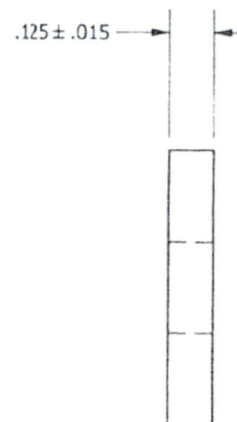
## NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH ASME Y14.5M 1994,  
DIMENSIONS AND TOLERANCING.

ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	SPECIFICATION	SIZE
1	1	314-0015-01	BEARPAW - FILLER BLOCK 1/8"	UHMW	---	1/8" THK.



FRONT  
SCALE 2 : 1



RIGHT  
SCALE 2 : 1

REVISION				
REV	DESCRIPTION	REVISED BY	APPROVED	DATE
A	INITIAL ISSUE	G.LAPOINTE	M. ZGELA	2006-09-06
B	0.25" HOLE, REMOVED REVISION LETTER FROM P/N	R.B.R.	M. ZGELA	2013-08-09

THIS DRAWING IS PROPERTY OF <b>HELITOWCART</b> AND MAY NOT BE COPIED OR DISTRIBUTED WITHOUT AUTHORIZATION.		<b>Helitowcart</b> (Vanair inc.) St-Nicolas, Levis, Qc, Canada www.helitowcart.com	
DRAFTED BY: G. LAPOINTE	DATE: 2006-09-06	DEFINITION: BEARPAW FILLER BLOCK 1/8"	
CHECKED BY:	DATE:		
APPROVED TCCA BY: M. ZGELA	DATE: 2006-09-06	DRAWING NUMBER: 314-0015-01	
IF NOT SPECIFIED GENERAL TOLERANCE		UNITS: INCH SIZE A SCALE: N/A	REV B
1/X ± 1/32 X.XX ± 0.010" X.XXX ± 0.005" ANG. ± 1°		SHEET: 1 OF 1	

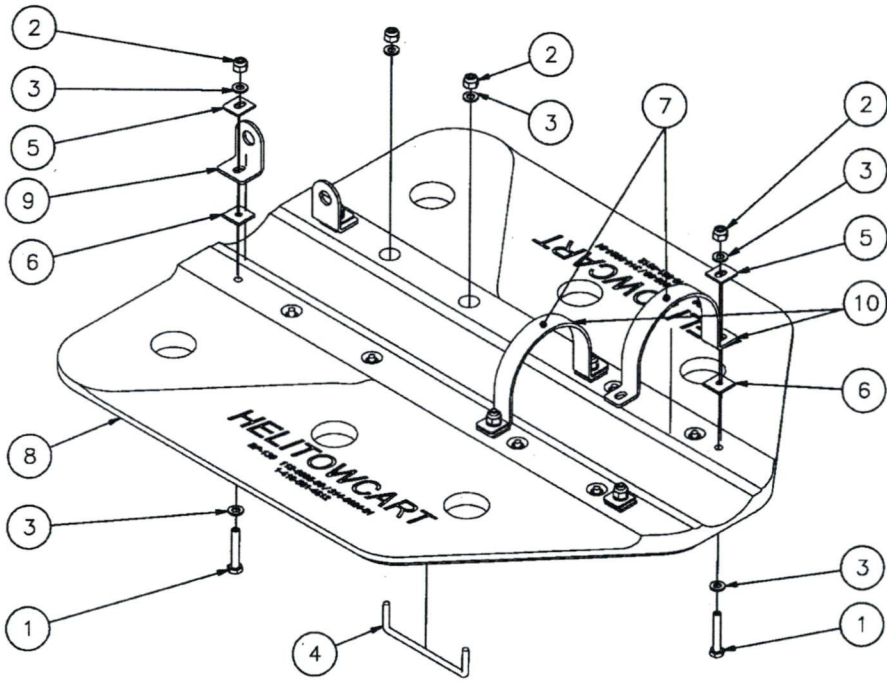
*D. Barla 2017.06.02*

314-0015-01 rev B

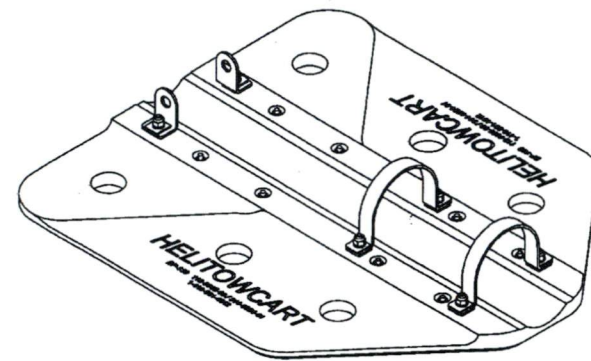


1		DWG No 112-0005-00		1		SHEET NO OF 1	
REVISIONS							
1		REWORKABLE		2		NONREWORKABLE	
3		NOTED		4		NA	
ZONE		REV		DESCRIPTION			
A		INITIAL RELEASE					
DR. & DATE		STRESS					

NOTE:  
 1. ICEBLADE ASSEMBLY, ITEM4, CAN BE OMITED FROM INSTALLATION (OPTIONAL)  
 2. FASTENER LENGTH CAN BE ADJUSTED AT INSTALLATION



ISO  
SCALE 1 / 4



ISO  
SCALE 1 / 5

10	2	314-0026-15	BP130 - U SHAPED CLIP	SST 304	12GA	
9	2	314-0025-15	BP130 - L SHAPED CLIP	SST 304	12GA	
8	1	314-0024-01	BEARPAW - BP130 PAD	POLYTHYLENE UHMW	BLACK	1
7	2	314-0021-01-A	SHRINK	RUBER	BLACK	
6	6	314-0015-01-A	FILLER BLOCK 1/8"	POLYTHYLENE UHMW		3/32 1/8"
5	6	314-0007-15-B	SLOTTED CLIP SUPPORT	STEEL		
4	4	314-0005-15-A	ICE BLADE ASSEMBLY	STEEL		1X6-1/4
3	20	263-0001-17-A	AN960-416	STEEL		1/4
2	14	262-0001-17-A	MS20365-428	STEEL		1/4-28
1	6	261-0001-17-A	AN4-14A	STEEL		1/4-28
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	SPECIFICATION	SIZE

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.		DRAWN: S. BERNIER 2010/12/02			<b>BEARPAW - BP130 ASSEMBLY</b>
LINEAR TOLERANCES: .XX ±0.030		DESIGNED: S. BERNIER 2010/12/02			
ANGULAR TOLERANCES: .XX ±0.010		CHECKED:			
ALL MACHINING SURFACES: .XX ±0.010		STRESS: S. BERNIER 2010/12/02			
WATERMARK: MATCUTL SPEC:		WEIGHT:		APPROVED:	
SIZE:		APPROVED:		APPROVED:	
HEAT TREAT:		APPROVED: M. ZGELA 2011/05/04		APPROVED:	
IDENTIFYING METHOD:				APPROVED:	
DASH NO	NEXT ASSY	QTY PER ACFT	MODEL	DASH CODE: B DRAWING No. 112-0005-00 SCALE: NTS SHEET: 1 OF 1	

*D. Bernier*  
 2011 05 27 as noted

112-0005-00 A

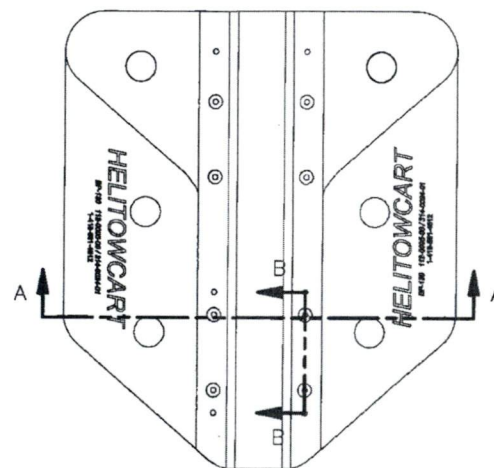
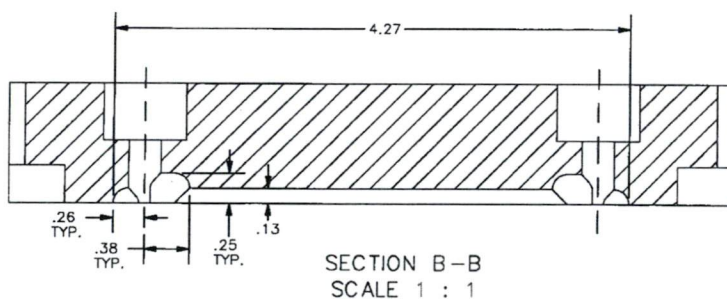
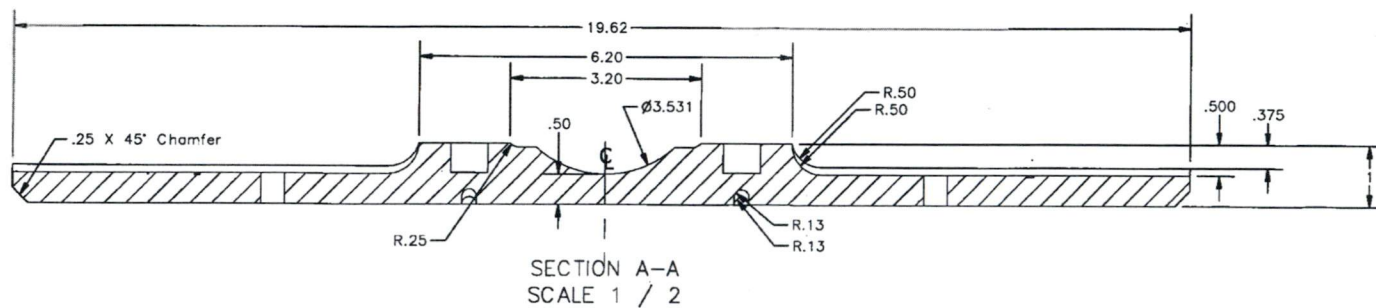




TIP: AVISER FOURN.  
AU MOMENT DU PO  
DE SE COMMANDER  
DU "1"-FORT; i.e.


1" TOLERANCE +

POUR FACILITER  
SON MACHINAGE  
JB



TOP  
SCALE 1 / 6

THE DESIGN DEPICTED IN THIS DRAWING IS THE EXCLUSIVE PROPERTY OF HELI TOW CART AND IN ACCEPTANCE OF THIS DRAWING THE RECIPIENT AGREES THAT IT WILL NOT BE USED FOR THE PURPOSE OF MANUFACTURE OR PROCUREMENT OF THE PART OR ASSEMBLY SHOWN HEREIN REPRODUCED OR OTHERWISE COPIED OR DISCLOSED TO ANY OTHER PERSON OR PARTY EXCEPT AS AUTHORIZED IN WRITING BY HELI TOW CART

DASH NO		NEXT ASSY		QTY PER ACFT		MODEL		UNLESS OTHERWISE SPECIFIED		DRAWN: S. BERNIER		2010/12/02		 Vendor Ref: Heli Aerospace Division 3400 S. 10th St. Grand Rapids, MI 49508 Phone: (616) 854-2291 www.helicopter.com	
								DRAWING: S. BERNIER		2010/12/02					
								TOLERANCES		XX		±0.00			
								CHECKED:							
								ANGULAR TOLERANCES ±0° 30'		STRESS: S. BERNIER		2010/12/02			
								ALL MACHINE SURFACE		WEIGHT:					
								MATERIAL:		APPROVED:					
								MILITARY SPEC:		APPROVED:					
								REWORK:		APPROVED: M. ZGELA		2011/08/04			
								HEAT TREAT:		C-3E CODE:		SIZ		DRAWING No.	
								PROTECTION:		B		314-0024-01		A	
								QUALIFYING METHOD:		DATE REV		REV		SHEET: 1 OF 1	

D. Barber  
2011 05 27

314-0024-01 A

4

3

2

1

DWG No 314-0024-01

3 OF 4

D

C

B

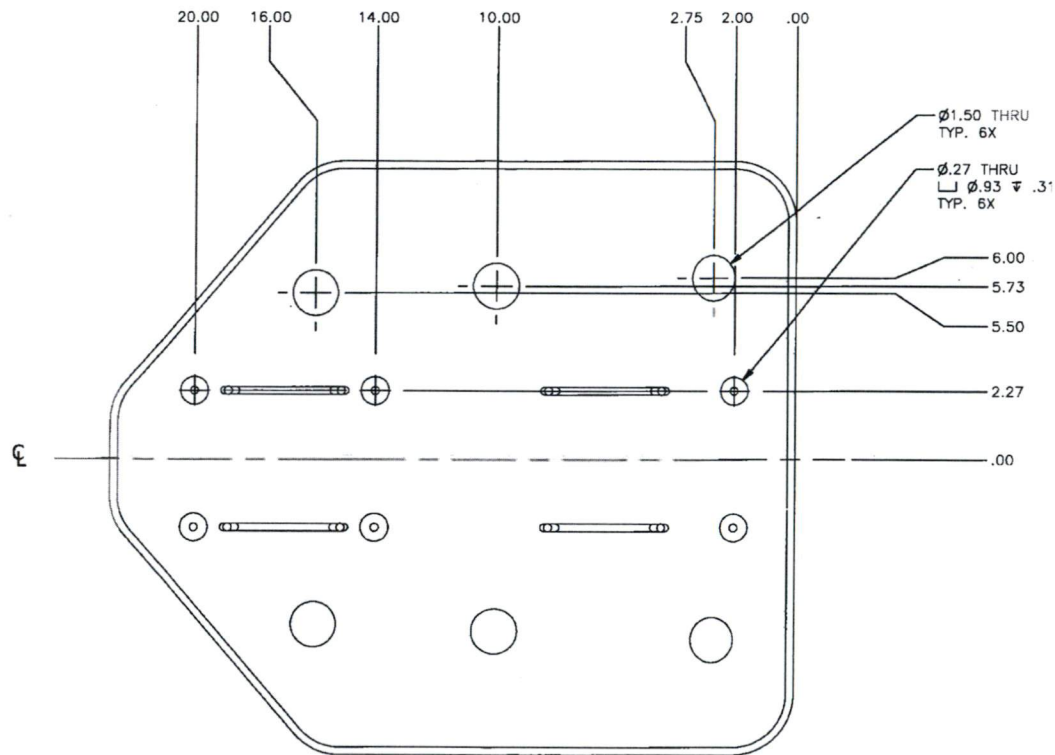
A

D


C

B

A



TOP  
SCALE 1 / 4

UNLESS OTHERWISE SPECIFIED				DRAWN: S. BERNIER	2010/12/02			Vander Inc. 8400 Highway 100 St-Hubert, QC J5Y 1S5 Canada, Q1A 3H1 Tel: (418) 841-1111 Fax: (418) 841-2291 www.helioncars.com	
DIMENSIONS ARE IN INCHES				DESIGNED: S. BERNIER	2010/12/02				
TOLERANCES				XX ±0.03	CHECKED:	STRESS: S. BERNIER		2010/12/02	
ANGULAR TOLERANCES: ±0.3°				XXX ±0.10	WEIGHT:				
ALL MACHINE SURFACES				✓	APPROVED:	APPROVED: M. ZGELA		2011/05/04	
MATERIAL:				SIZE:	PROTECTION:				
IDENTIFYING METHOD:						SCALE: N/A		SIZE CODE: B DRAWING No: 314-0024-01 SHEET: 3 OF 4	
DISH NO	NEXT ASSY	QTY PER ACFT	MODEL						

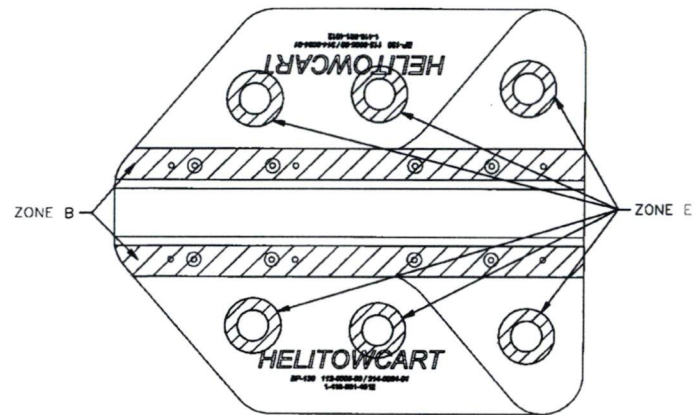
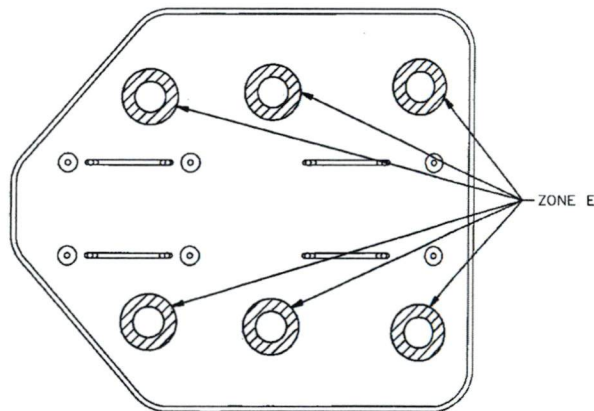
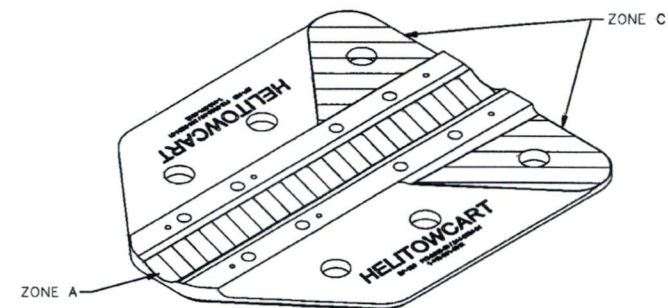
J. Barthelemy  
2011 05 27

314-0024-01 A




NOTE:

1. ZONE D = ALL NON-SHADED AREA

TOP  
SCALE 0.17 : 1BOTTOM  
SCALE 0.17 : 1ISO  
SCALE 0.17 : 1

THE DESIGN SHOWN IN THIS DRAWING IS THE EXCLUSIVE PROPERTY OF HELI TOW CART AND IN ACCEPTANCE OF THIS DRAWING THE RECIPIENT AGREES THAT IT WILL NOT BE USED FOR THE PURPOSE OF MANUFACTURE OR PROCUREMENT OF THE PART OR ASSEMBLY SHOWN HEREIN REPRODUCED OR OTHERWISE COPIED OR DISCLOSED TO ANY OTHER PERSON OR PARTY EXCEPT AS AUTHORIZED IN WRITING BY HELI TOW CART

				UNLESS OTHERWISE SPECIFIED		DRAWN: S. BERNIER		2010/12/02		 <div>Vendre inc. 3811 Avenue Michèle St-Hubert, Québec Canada J5A 2P9 Tel: (418) 861-8817 Fax: (418) 861-2291 www.helitowcart.com</div>	
				DIMENSIONS ARE IN INCHES		DESIGNED: S. BERNIER		2010/12/02			
				UNC B		XX	±0.030		CHECKED:		
				TOLERANCES		XXX	±0.010				
				ANGULAR TOLERANCES		±0.30°		STRESS: S. BERNIER		2010/12/02	
				MAX. MACHINING SURFIDE		✓		WEIGHT:		BEARPAW - BP130	
				HATCH:		MATERIAL SPEC:		APPROVED:		PAD	
				SIZE:		HEAT TREAT:		APPROVED:		DATE CODE: B 314-0024-01	
				PROTECTION:		IDENTIFYING METHOD:		APPROVED: M. ZIGLA		DRAWING NO: A	
								2011/05/04		SCALE: NTS C.D. FILE: 314-0024-01.dwg SHEET: 4 OF 4	
DASH NO		NEXT ASSY		QTY PER C/FT		MODEL					

S. Bernier  
2011 05 27

314-0024-01 A

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391	1392	1393	1394	1395	1396	1397	1398	1399	1400	1401	1402	1403	1404	1405	1406	1407	1408	1409	1410	1411	1412	1413	1414	1415	1416	1417	1418	1419	1420	1421	1422	1423	1424	1425	1426	1427	1428	1429	1430	1431	1432	1433	1434	1435	1436	1437	1438	1439	1440	1441	1442	1443	1444	1445	1446	1447	1448	1449	1450	1451	1452	1453	1454	1455	1456	1457	1458	1459	1460	1461	1462	1463	1464	1465	1466	1467	1468	1469	1470	1471	1472	1473	1474	1475	1476	1477	1478	1479	1480	1481	1482	1483	1484	1485	1486	1487	1488	1489	1490	1491	1492	1493	1494	1495	14
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	----

4

3

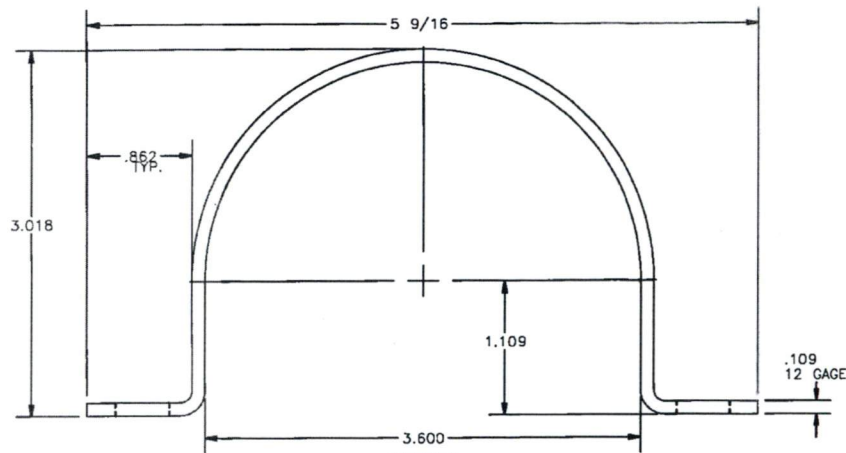
2

1

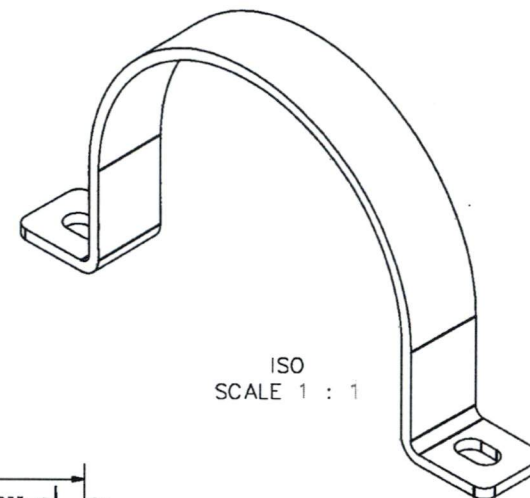
DWG No 314-0026-15

1 OF 1

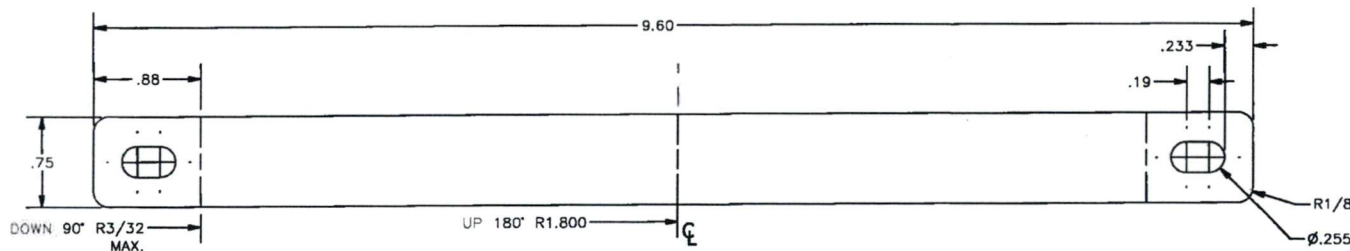
REVISIONS				DATE	DR. & DATE	STRESS
1	2	3	4			
REWORKABLE	NONREWORKABLE	NOTED	NA			
ZONE	REV	DESCRIPTION				
A		INITIAL ISSUE				



FRONT  
SCALE 1 : 1



ISO  
SCALE 1 : 1



FLAT PATTERN  
SCALE 1 : 1

THE DESIGN DEPICTED IN THIS DRAWING IS THE EXCLUSIVE PROPERTY OF HELI TOW CART AND IN ACCEPTANCE OF THIS DRAWING THE RECIPIENT AGREES THAT IT WILL NOT BE USED FOR THE PURPOSE OF MANUFACTURE OR REPRODUCTION OF THE PART OR OTHERWISE COPIED OR DISCLOSED TO ANY OTHER PERSON OR PARTY EXCEPT AS AUTHORIZED IN WRITING BY HELI TOW CART

1	1	314-0026-15	BP130 - U SHAPED CLIP	SST 304	SIZE
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	SIZE
			UNLESS OTHERWISE SPECIFIED		
			DIMENSIONS ARE IN INCHES		
			FINISH		
			TOLERANCES		
			XXX ±0.030		
			XXX ±0.010		
			ANGULAR TOLERANCES ±0.30°		
			ALL MACHINE SURFACES		
			WEIGHT:		
			MATERIAL SPEC:		
			SIZE:		
			HEAT TREAT:		
			IDENTIFYING METHOD:		
			DRAWN: S. BERNIER	2011/12/02	
			DESIGNED: S. BERNIER	2010/12/02	
			CHECKED:		
			STRESS: S. BERNIER	2011/12/02	
			APPROVED:		
			APPROVED:		
			APPROVED: M. ZGELA	2011/08/04	
			CAGE CODE: B	314-0026-15	
			SCALE: 1/8"		
			SHEET: 1 OF 1		

4

3

2

1

J. Barton  
2011 05 27

314-0026-15 A



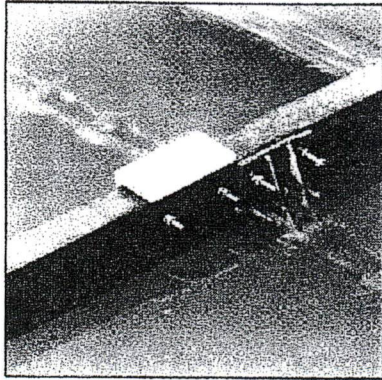
# Ultra High Molecular Weight Polyethylene

## UHMWPE Typical Properties

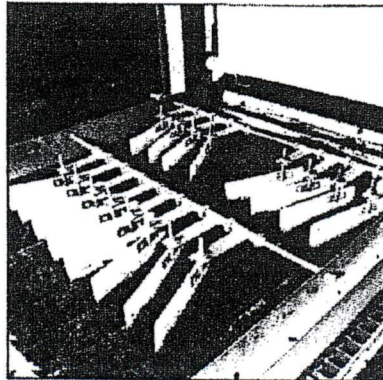
Specific Gravity, 73°F	.944	
Tensile Strength @ Yield, 73°F	3250	psi
Tensile Modulus of Elasticity, 73°F	155,900	psi
Tensile Elongation (at break), 73°F	330	%
Flexural Modulus of Elasticity	107,900	psi
Compressive Strength at 2% deformation	400	psi
Compressive Strength 10% Deformation	1200	psi
Deformation Under Load	6-8	%
Compressive Modulus of Elasticity, 73°F	69,650	psi
Hardness, Durometer (Shore "D" scale)	69	
Izod Impact, Notched @ 73°F	30	ft.lbs./in. of notch
Coefficient of Friction (Dry vs Steel) Static	.17	
Coefficient of Friction (Dry vs Steel) Dynamic	.14	
Sand Wheel Wear/Abrasion Test	95	UHMW=100
Coefficient of Linear Thermal Expansion	11.0	in/in/°F x 10 <sup>-5</sup>
Melting Point (Crystalline Peak)	279-289	°F
Volume Resistivity	>10 <sup>15</sup>	ohm-cm
Surface Resistivity	>10 <sup>15</sup>	ohm-cm
Water Absorption, Immersion 24 Hours	Nil	%
Water Absorption, Immersion Saturation	Nil	%
Machinability Rating	5	1 = easy, 10 = difficult
Sheet Thickness Availability (Off the Shelf)	.250 - 2.0	inches



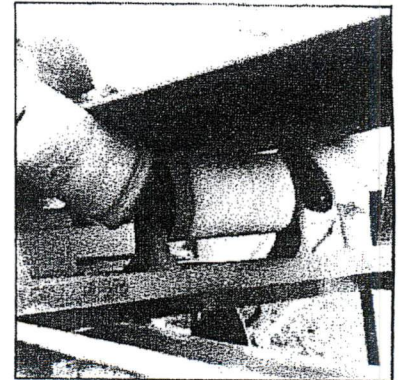
## Propriétés du UHMW TIVAR®



TIVAR flight wear shoes do not corrode, and outwear shoes made from metals, urethanes and other plastics.



TIVAR is used in many OEM applications to solve abrasion and corrosion problems. The scrapers on this belt press are of TIVAR.



Conveyor rollers lined with TIVAR reduce belt wear. Wet sludge doesn't build up as on conventional rollers.

PROPERTY		TEST METHOD		UNIT	TYPICAL VALUE
Specific Gravity		ASTM D-792		g/cm <sup>3</sup>	0.94
Yield Strength	@ 73°F	ASTM D-638		p.s.i.	3400
Ultimate Tensile Strength	@ 73°F	ASTM D-638		p.s.i.	6800
Break Elongation	@ 73°F	ASTM D-638		%	450
Yield Strength	@ 250°F	Stress Strain Diagram		p.s.i.	700
Ultimate Tensile Strength	@ 250°F	Stress Strain Diagram		p.s.i.	3300
Break Elongation	@ 250°F	Stress Strain Diagram		%	900
Hardness — Rockwell "R" Scale		ASTM D-785		—	64
Shore "D" Scale		ASTM D-2240		—	67
Flexural Modulus of elasticity		Bend Creep/1 min. value		p.s.i.	110,000
Shear Strength		ASTM D-732		p.s.i.	3500
Izod Impact + @ 23°C		ASTM D-256A		ft-lbs/in. notch	No Break
— @ 140°C		ASTM D-256A		ft-lbs/in. notch	No Break
Environmental Stress Cracking @ F <sub>50</sub>		ASTM D-1693 Mod		hrs.	6000
Water Absorption		ASTM D-670		—	NIL

## COEFFICIENT OF FRICTION

UHMW Polymer has a lower coefficient of friction than glass. Together with its self-lubricating characteristics it is an ideal material for bearings, bushings, valves, wear strips or any application where sliding contact is encountered.

**MATERIALS**  
Mild Steel vs. Mild Steel  
Mild Steel vs. TIVAR-100  
TIVAR-100 vs. TIVAR-100

**STATIC**  
0.30-0.40  
0.15-0.20  
0.20-0.30

**KINETIC**  
0.25-0.35  
0.12-0.20  
0.20-0.30

**TEST METHOD**  
ASTM D-1894

DEFORMATION UNDER COMPRESSION - %							PERMANENT DEFORMATION AFTER REMOVAL OF LOAD	
TEMP °F	PSI COMPRESSION	INITIAL LOADING					AFTER 1 MIN.	AFTER 24 HRS.
		10 MIN.	100 MIN.	1000 MIN.	1 DAY	56 DAYS		
68°	282	1.5	1.7	1.8	1.9	2.4	0.9	0.8
	570	2.4	2.5	2.7	3.0	4.0	1.8	1.2
	950	3.0	4.0	4.5	5.0	5.1	2.7	1.8
	1140	4.0	5.0	6.0	7.0	7.5	3.6	2.4
	1420	5.0	6.5	7.5	8.0	9.0	4.5	2.9
	1700	7.0	7.5	8.0	10.0	11.0	5.4	3.5

## CHEMICAL RESISTANCE

Hydrochloric acid (conc.) - no appreciable reaction up to 80°C

Nitric acid (20%) - less than 20% decrease in yield stress and ultimate tensile strength up to 80°C.

Sulphuric acid (50%) - no appreciable reaction up to 80°C. Less than 20% decrease in properties at 75% concentration.

Sodium hydroxide (caustic soda) - no appreciable reaction up to 80°C.

Sodium hypochlorate and most aqueous solutions of inorganic salts - no appreciable reaction up to 80°C.

Hydrocarbons and halogenated hydrocarbons - limited resistance. Each application should be evaluated.

www.plastiquepolyfab.com

QUÉBEC : 1275, de la Jonquière, Québec, QC, Tél. : 418-682-0760 ou 1-866-682-0760  
MONTREAL : 7600, Rte Transcanadienne, St-Laurent, QC, H4T 1A5 Tél. : 514-738-6817 ou 1-888-506-9600



MIL-DTL-23053/5C,  
CLASS 1, 2  
UL STANDARD 224  
CSA STANDARD 198  
RoHS COMPLIANT

# **FIT® Preferred Heat Shrink Products**

## **GENERAL PURPOSE, IRRADIATED POLYOLEFIN**

### **FIT®-221**

Alpha Part No. And Size	Minimum Supplied I.D.		Maximum Recovered I.D.		Nom. Recovered Wall Thickness		4 Ft. Lengths Total Ftg.	Standard Packages			No. Cut Pieces 6 Inch	No. Cut Pieces 1/2" or 1"
	Inches	mm	Inches	mm	Inches	mm		Tot. Ftg.	Tot. Ftg.	Tot. Ftg.		
<b>FIT-221-3/64</b>	0.046	1,17	0.023	0,58	0.016	0,41	100	1000			40	1000
<b>FIT-221-1/16</b>	0.063	1,60	0.031	0,78	0.017	0,43	100	1000	100	70	36	1000
<b>FIT-221-3/32</b>	0.093	2,36	0.046	1,17	0.020	0,50	100	500	100	65	32	1000
<b>FIT-221-1/8</b>	0.125	3,18	0.062	1,58	0.020	0,50	100	500	100	60	28	1000
<b>FIT-221-3/16</b>	0.187	4,75	0.093	2,36	0.020	0,50	100	500	100	50	24	1000
<b>FIT-221-1/4</b>	0.250	6,35	0.125	3,18	0.025	0,63	100	250	100	40	20	1000
<b>FIT-221-3/8</b>	0.375	9,53	0.187	4,75	0.025	0,63	100	200	50	35	16	1000
<b>FIT-221-1/2</b>	0.500	12,70	0.250	6,35	0.025	0,63	20	150	50	32	14	-
<b>FIT-221-3/4</b>	0.750	19,10	0.375	9,53	0.030	0,76	20	250	50	24	12	-
<b>FIT-221-1</b>	1.000	25,40	0.500	12,70	0.035	0,88	20	250	50	16	8	-
<b>FIT-221-1-1/2</b>	1.500	38,10	0.750	19,10	0.040	1,02	20	125	-	-	5	-
<b>FIT-221-2</b>	2.000	50,80	1.000	25,40	0.045	1,16	20	125	-	-	3	-
<b>FIT-221-3</b>	3.000	76,20	1.500	38,10	0.050	1,27	8	100	-	-	2	-
<b>FIT-221-4</b>	4.000	101,60	2.000	50,80	0.055	1,40	8	50	-	-	1	-

115

#### SPOOL COLOR AVAILABILITY CHART

<b>FIT-221</b> Tubing Size	Put-Up	Colors		<b>FIT-221</b> Tubing Size	Put-Up	Colors
3/64"	1000'	Black, Clear		3/8"	200'	All Colors
1/16"	1000'	All Colors*		50'	Black, Clear	
	100'	Black, Clear		35'	All Colors	
	70'	All Colors		1/2"	150'	All Colors
3/32"	500'	All Colors		50'	Black, Clear	
	100'	Black, Clear		32'	All Colors	
	65'	All Colors		3/4"	250'	All Colors
1/8"	500'	All Colors		50'	Black, Clear	
	100'	Black, Clear		24"	All Colors	
	60'	All Colors		1"	250"	All Colors
3/16"	500'	All Colors		50"	Black, Clear	
	100'	Black, Clear	→	16"	All Colors	
	50'	All Colors		1-1/2"	125'	Black, Clear
1/4"	250'	All Colors		2"	125'	Black, Clear
	100'	Black, Clear		3"	100'	Black, Clear
	40'	All Colors		4"	50'	Black, Clear

\*All colors include black, white, clear, red, yellow, blue, green

**SEE PAGE 116  
FOR  
ECONOMICAL BULK PACKAGES!**

*D. P. Barber* 2011 05 27

Helitowcart 314-0017-05-A (page 1/1)  
Web Site: [www.alphawire.com](http://www.alphawire.com)  
Email: [info@alphawire.com](mailto:info@alphawire.com)

Toll Free: 1-800-52 ALPHA • Telephone: 908-925-8000 • Fax: 908-925-6923  
Europe/UK Telephone: +44 (0) 1932 772422 • Europe/UK Fax: +44 (0) 1932 772433





# **FIT**® Preferred Heat Shrink Products

## GENERAL PURPOSE, IRRADIATED POLYOLEFIN

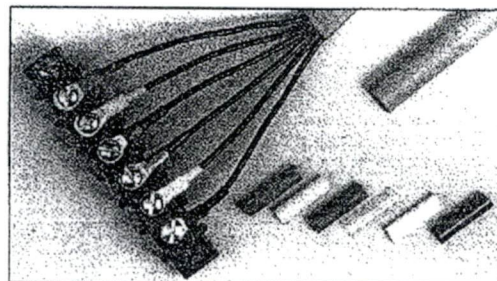
### **FIT-221** FOR BEARLAWS

MIL-DTL-23053/5C,  
CLASS 1, 2  
UL STANDARD 224  
CSA STANDARD 198

### CHOOSE **FIT-221** FOR:

- General Purpose Protection and Repair
- Identification and Beautifying Substrates
- Insulation from Environment
- Reduced Longitudinal Shrinkage
- Resistance to Water, Fungus, UV Light (black only)
- Use with **XTRA-GUARD® 1**

**2 TO 1** SHRINK RATIO



### **FIT-221** APPLICATIONS:

- General Purpose Insulation and Repair
- Wire and Cable Harnessing and Bundling
- Cable and Connector Protection
- Wire and Tubing Splicing and Connecting
- **XTRA-GUARD® 1** Applications
- Automated Cutting Machines (spools)

### CHARACTERISTICS

#### OPERATING TEMPERATURE:

- -55°C to 135°C

#### SHRINKAGE RATIO:

- Approximately 2 to 1 at 121°C

#### COLOR DESCRIPTION:

- 4-Foot Lengths:  
3/64 to 2 Inch — Black, White, Clear, Red, Yellow, Blue, Green  
3 and 4 Inch — Black, Clear
- 6-Inch Lengths:  
3/64 to 1 Inch — Black, White, Clear, Red, Yellow, Blue, Green  
1-1/2 to 3 Inch — Black, Clear
- 1/2 or 1 Inch Cut Pieces: Black
- Spools: See Color Availability Chart Next Page

#### PHYSICAL PROPERTIES:

- Tensile Strength: 1500 psi, (106 kg/cm<sup>2</sup>)
- Ultimate Elongation: 200%
- Longitudinal Shrinkage: -5%
- Specific Gravity: 1.35
- Secant Modulus: 2.5 x 10<sup>4</sup> max.
- Flammability: Self-Extinguishing

#### CHEMICAL PROPERTIES:

- Corrosive Effect: Passes Copper Stability Test
- Fungus Resistance: No Growth

#### ELECTRICAL PROPERTIES:

- Dielectric Strength: 500V/mil (197 kV/cm)
- Volume Resistivity: 10<sup>14</sup> ohm-cm

### SPECIFICATIONS

- MIL-DTL-23053/5C, Class 1, 2
- UL Standard 224 (except for Clear)
- CSA Standard 198 (except for Clear)



Recognized  
Component  
Underwriters Laboratories Inc.



Certified  
Canadian Standards Association

**Packaged Assortments**  
Assorted Sizes of 6" Lengths  
Each Length — Size Identified  
Assorted Colors

Alpha Part No.	Tubing Size Range	Lengths Per Box
<b>FIT-221-MS-1</b>	3/64" — 3/16" (5 Sizes)	6 per Size (30 Lengths)
<b>FIT-221-MS-2</b>	1/4" — 3/4" (4 Sizes)	4 per Size (16 Lengths)

WE PURCHASE

1.5" wide



**Recommended For Use With**  
**XTRA-GUARD® 1**  
**Extra-Premium Grade PVC Jacketed**  
**General Purpose Cables**



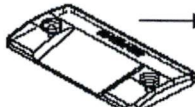
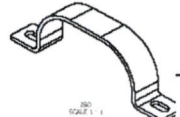

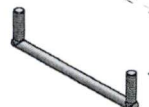


Toll Free: 1-800-52 ALPHA • Telephone: 908-925-8000 • Fax: 908-925-6923  
Europe/UK Telephone: +44 (0) 1932 772422 • Europe/UK Fax: +44 (0) 1932 772433

Web Site: [www.alphawire.com](http://www.alphawire.com)  
Email: [info@alphawire.com](mailto:info@alphawire.com)

1958-Back



**314-0010-00-i**  
Bearpaws Parts List

			Quantities per PAIR		
Part Name		HTC P/N	BP44	BP350	BP130
PADS	Pad /BP44	314-0001-01	2		
	Pad /BP350	314-0018-01		2	
	Pad /BP130	314-0024-01			2
<div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div>→ Rear Filler block/BP44</div><div>→ U-Clip / BP44</div><div>→ U-Clip / BP350</div><div>→ U-Clip / BP130</div><div>→ Low U-Clip/ BP44</div><div>→ Shrink on U-Clips</div><div>→ L-Clip/BP130</div><div>→ Iceblade</div><div>→ Slotted clip support</div><div>→ Bolt - AN4-14A</div><div>→ Bolt - AN4-15A</div><div>→ Bolt - AN4-16A</div><div>→ Nuts - MS20365-428</div><div>→ equiv: AN365-428A or MS21044N4</div><div>→ Washers - AN960-416</div><div>→ Filler block 1/4"</div><div>→ Filler block 3/32"</div><div>→ Filler block 1/8"</div></div>	Plastic bag 8x10	na	2	2	2
		314-0022-01	2		
		314-0006-15	4		
		314-0019-15		6	
		314-0026-15			4
		314-0023-15	2		
		314-0021-01	6	6	6
		314-0025-15			4
		263-0005-15	4	8	8
		314-0007-15	8	12	12
		261-0001-17		12	12
		261-0002-17	4		
		261-0003-17	4		
		262-0001-17	20	28	28
		263-0001-17	40	40	40
		314-0012-01	4	12	
		314-0014-01	4		
		314-0015-01	4		12
	DOCUMENTS	Plastic bag 9 x12	na	1	1
Document - MDL/BP44		HTC-MDL-BP-R44-1000	1		
Document - INST/BP44		314-0011-00	1		
Document - MDL/BP350		HTC-MDL-BP-AS350-1000		1	
Document - INST/BP350		314-0018-01-S		1	
Document - MDL/BP130		HTC-MDL-BP-EC130-1000			1
Document - INST/BP130		314-0031-00			1
Can STC		na	1	1	1
US STC		na	1	1	1
PACKAGING	Box / BP44 16.5x13x3.5"	na	1		
	Box / BP350 & BP130 24x21x3"	na		1	1
	Label /BP44	273-0001-04	1		
	Label /BP350 & BP130	273-0002-04		1	1

Nature of modifications: New format, added BP130

314-0010-00-i BearPaw Parts List (2011 05 27)

*P. Barber 2011 05 27*

**1- Inspecter composantes fabriquées: (Par Quality System Manager)**

- Utiliser formulaire F30-01 Receiving Inspection General
- Prendre connaissance des données d'inspection des fabricants
- Utiliser plan d'inspection prescrit (modifier le plan d'inspection au besoin)
- Assigner no de lot "LN-yymmdd-xx". (xx étant le séquentiel).
- Identifier le contenant avec le no de lot assigné, le P/N de la pièce et la quantité
- Ranger en zone de storage des pièces de BearPaws

TO DO:  
CHANGE TEXT  
TO ENGLISH

**2- Effectuer emballage des kits: (Par Quality System Manager)**

- Insérer toutes les petites composantes dans des sacs
- Insérer les deux Pads de bearpaws ainsi que les sacs de composantes dans la boîte appropriée
- Bourrer contenu de la boîte de papier protecteur (si applicable)
- Apposer étiquette d'identification du type de produit sur la boîte. Cocher le produit applicable.

**3- Effectuer assemblage documentaire: (Par Quality System Manager)**

- Assembler dans sacs :
  - (1) Master Document List (MDL)
  - (2) Instruction d'installation du produit
  - ~~(3) Certificat de fabricant SH06-24~~ N.B 2016 06 10
  - (4) STC Transport Canada
  - (5) STC FAA USA

**4- Inspecter produit fini: (Par Quality System Manager)**

- Utiliser formulaire F40-02 Release Inspection General
- Utiliser plan d'inspection prescrit et modifier le plan d'inspection au besoin
- Effectuer les contrôles prescrits et Enregistrer résultats.
- Enregistrer données de traçabilité des composantes utilisées (utiliser tableau en annexe si trop de données de sous lots pour le tableau situé sur le formulaire F40-02)
- Assigner no de lot "LNF-yymmdd-xx". (xx étant le séquentiel).
- Émettre certificat de relâche temporaire pour chaque kit (F40-01 Authorized Release Certificate)
- Identifier au marqueur chaque boîte avec le no LNF et son no de kit (séquentiel), (no doit être bien en vue lorsque les boîtes sont mises prêtes à expédier)
- Apposer le formulaire F40-01 Release Certificate temporaire avec le bon séquentiel sur le rebord de chaque boîte (facilement détachable pour émettre le certificat en version finale au moment venu)
- Ranger les kits assemblés dans la zone de storage des bearpaws prêts à vendre

**5- Au moment de la vente: (Par Quality System Manager)**

- Émettre certificat de relâche officiel (F40-01 Authorized Release Certificate). Réaliser le certificat sur format électronique (Données électroniques localisées à : Quality System/ Official Records/ Release Certificates), le nommer avec le no de facture et nom de l'acheteur. Mettre en pied de page le nom du fichier créé. Imprimer. Signer ce certificat original.
- Conserver une copie du certificat signé au DHR avec la copie temporaire, classer par ordre de no de lot.
- Insérer l'originale signée dans le sac de documents dans la boîte à expédier.

Nature de la modification de l'instruction : Revue en profondeur de la méthode de travail.



2011 12 10



**1- Install Shrink:**

- Prepare Heat Shrink:

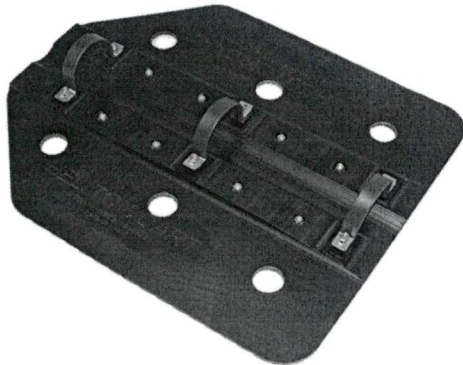
BP44 & BP66: Use ~~transparent~~ shrink (~~black authorized if transparent is not available~~).  
Use ~~1"~~ <sup>1.5"</sup> wide shrink. Cut to ~~5"~~ <sup>5.5"</sup> length.

BP350 & BP130: Use ~~black~~ shrink (~~transparent authorized if black is not available~~).  
Use ~~1"~~ <sup>1.5"</sup> wide shrink. Cut to ~~6.25"~~ <sup>6.75"</sup> length.

- Insert U clips into shrink. (~~if applicable: Use soapy water to help insertion~~)
- Set U clips on their side on aluminum sheet on cookie pan
- Heat oven at 350F for 30 min.

*DR*  
*2016 0610*

Nature modifications: Complete update of instruction



**HELI**  
**TOW CART**

*By Vanair*

☐ BP350 BearPaw (2)

☐ BP130 BearPaw (2)

877A Alphonse-Desrochers, Saint-Nicholas, Levis, Quebec, Canada G7A 5K6 / Made in Canada

[www.helitowcart.com](http://www.helitowcart.com) +1.418.561.4512 [info@helitowcart.com](mailto:info@helitowcart.com)

htc 273-0002-04-D



**HELI**  
**TOW CART**

*By Vanair*

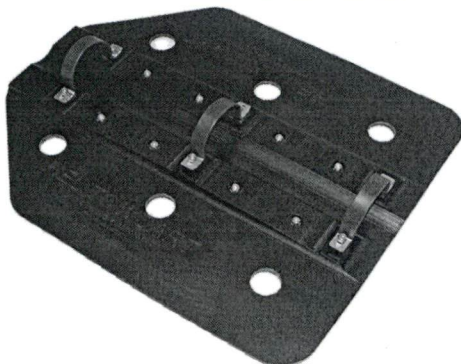
☐ BP350 BearPaw (2)

☐ BP130 BearPaw (2)

877A Alphonse-Desrochers, Saint-Nicholas, Levis, Quebec, Canada G7A 5K6 / Made in Canada

[www.helitowcart.com](http://www.helitowcart.com) +1.418.561.4512 [info@helitowcart.com](mailto:info@helitowcart.com)

htc 273-0002-04-D



**HELI**  
**TOW CART**

*By Vanair*

☐ BP350 BearPaw (2)

☐ BP130 BearPaw (2)

877A Alphonse-Desrochers, Saint-Nicholas, Levis, Quebec, Canada G7A 5K6 / Made in Canada

[www.helitowcart.com](http://www.helitowcart.com) +1.418.561.4512 [info@helitowcart.com](mailto:info@helitowcart.com)

htc 273-0002-04-D



13 Rectilinear

**Protect your helicopter with BearPaws**



**BearPaws**

For **R44, AS350, EC130**

**BP44, BP350, BP130**

**Perform Safe landings on *Snow*, on *Clear Ice*,  
as well as on *Spongy Soils* & in *Rivers***

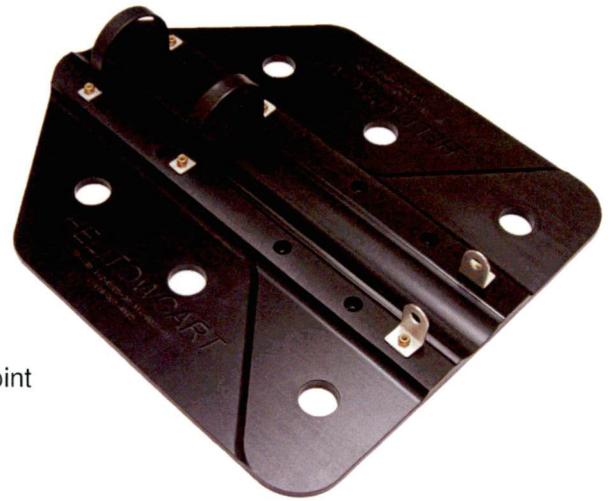
**Helitowcart BearPaws offer  
*Great Quality at an Affordable Price***

**Efficient Design**

- 1) Pad shape streamlined to allow dust & gravel to easily flow off
- 2) Pad with flow holes to allow water release when taking off from rivers
- 3) Pad shape reinforced at rear for long term durability of landing contact point

**Sturdy Construction**

- 1) Sturdy Attachment Clips made of 14ga Stainless Steel
- 2) Pads made of Long Lasting UHMW-Polymer for best sturdiness-flexibility ratio
- 3) Pads profile optimized through finite element analysis to obtain best lightweight-strength ratio



**Iceblades:** Helitowcart introduced iceblades for bearpaws to provide better traction on clear ice. This reduces risks of helicopter skidding on ice. Iceblades also offer extra protection to pads especially for helicopters used for training. Iceblades are included with the BearPaw kit.

Models:	BP44	BP350	BP130
For	R44	AS350, AS355	EC130
			
	<b>New</b> Larger Pad		<b>New</b> for EC130
STCs	Canada : Q-SH-06-24 United States: SR02432NY Australia & New Zealand: Use US STC	Canada : Q-SH-06-24 United States: SR02432NY Australia & New Zealand: Use US STC	Canada : Q-SH-06-24 United States: SR02432NY Australia & New Zealand: Use US STC
P/N Name: Weight	112 0001 00 C BP44 Bearpaws 6.9 lbs / 3.1 kg	112 0002 00 B BP350 Bearpaws 18.3 lbs / 8.5kg	112 0005 00 A BP130 Bearpaws 20 lbs / 9.1kg

ADLIN